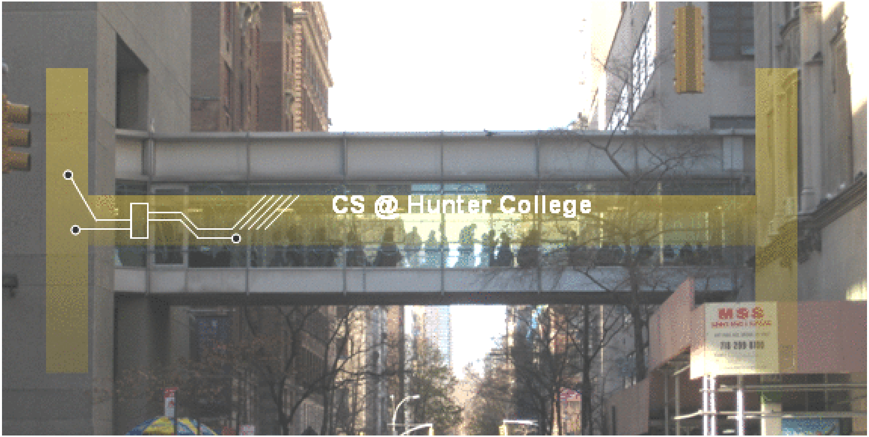
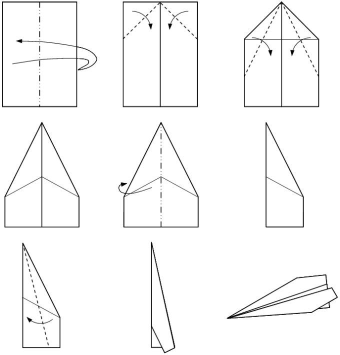
CSci 127: Introduction to Computer Science



hunter.cuny.edu/csci

Announcements



- Guest Lecturer: Katherine Howitt

Frequently Asked Questions

From lecture slips & recitation sections.

Frequently Asked Questions

From lecture slips & recitation sections.

- Can I get a copy of the lecture slides and programs from lecture?

Frequently Asked Questions

From lecture slips & recitation sections.

- Can I get a copy of the lecture slides and programs from lecture?
  Yes, the slides are posted on the class website.

Frequently Asked Questions

From lecture slips & recitation sections.

- Can I get a copy of the lecture slides and programs from lecture?
  Yes, the slides are posted on the class website.
- Can I work ahead on programs?

Frequently Asked Questions

From lecture slips & recitation sections.

- Can I get a copy of the lecture slides and programs from lecture?
  Yes, the slides are posted on the class website.
- Can I work ahead on programs?
  Yes, you'll get the most out of lecture if you're 5 or so programs ahead. We give an extra 7-10 days on deadlines from when material is presented.

Frequently Asked Questions

From lecture slips & recitation sections.

- Can I get a copy of the lecture slides and programs from lecture?
  Yes, the slides are posted on the class website.
- Can I work ahead on programs?
  Yes, you'll get the most out of lecture if you're 5 or so programs ahead. We give an extra 7-10 days on deadlines from when material is presented.
- I'm sure I did Problem 9 correctly, but Gradescope disagrees. Why?

Frequently Asked Questions

From lecture slips & recitation sections.

- Can I get a copy of the lecture slides and programs from lecture?
  Yes, the slides are posted on the class website.
- Can I work ahead on programs?
  Yes, you'll get the most out of lecture if you're 5 or so programs ahead. We give an extra 7-10 days on deadlines from when material is presented.
- I'm sure I did Problem 9 correctly, but Gradescope disagrees. Why?
  Some of the grading scripts are really finicky about spacing and new lines. Let us know– some we can fix, some have to match exactly.

Frequently Asked Questions

From lecture slips & recitation sections.

- Can I get a copy of the lecture slides and programs from lecture?
  Yes, the slides are posted on the class website.
- Can I work ahead on programs?
  Yes, you'll get the most out of lecture if you're 5 or so programs ahead. We give an extra 7-10 days on deadlines from when material is presented.
- I'm sure I did Problem 9 correctly, but Gradescope disagrees. Why?
  Some of the grading scripts are really finicky about spacing and new lines. Let us know– some we can fix, some have to match exactly.
- I don't get the brackets. Why are using them? Why not parenthesis?

Frequently Asked Questions

From lecture slips & recitation sections.

- Can I get a copy of the lecture slides and programs from lecture?
  Yes, the slides are posted on the class website.
- Can I work ahead on programs?
  Yes, you'll get the most out of lecture if you're 5 or so programs ahead. We give an extra 7-10 days on deadlines from when material is presented.
- I'm sure I did Problem 9 correctly, but Gradescope disagrees. Why?
  Some of the grading scripts are really finicky about spacing and new lines. Let us know– some we can fix, some have to match exactly.
- I don't get the brackets. Why are using them? Why not parenthesis?
  Parenthesis are for functions:

Frequently Asked Questions

From lecture slips & recitation sections.

- Can I get a copy of the lecture slides and programs from lecture?
  Yes, the slides are posted on the class website.
- Can I work ahead on programs?
  Yes, you'll get the most out of lecture if you're 5 or so programs ahead. We give an extra 7-10 days on deadlines from when material is presented.
- I'm sure I did Problem 9 correctly, but Gradescope disagrees. Why?
  Some of the grading scripts are really finicky about spacing and new lines. Let us know– some we can fix, some have to match exactly.
- I don't get the brackets. Why are using them? Why not parenthesis?
  Parenthesis are for functions: `print("Hi!")`

Frequently Asked Questions

From lecture slips & recitation sections.

- Can I get a copy of the lecture slides and programs from lecture?
  Yes, the slides are posted on the class website.
- Can I work ahead on programs?
  Yes, you'll get the most out of lecture if you're 5 or so programs ahead. We give an extra 7-10 days on deadlines from when material is presented.
- I'm sure I did Problem 9 correctly, but Gradescope disagrees. Why?
  Some of the grading scripts are really finicky about spacing and new lines. Let us know– some we can fix, some have to match exactly.
- I don't get the brackets. Why are using them? Why not parenthesis?
  Parenthesis are for functions: `print("Hi!")` *or* `tori.left(90)`

Frequently Asked Questions

From lecture slips & recitation sections.

- Can I get a copy of the lecture slides and programs from lecture?
  Yes, the slides are posted on the class website.
- Can I work ahead on programs?
  Yes, you'll get the most out of lecture if you're 5 or so programs ahead. We give an extra 7-10 days on deadlines from when material is presented.
- I'm sure I did Problem 9 correctly, but Gradescope disagrees. Why?
  Some of the grading scripts are really finicky about spacing and new lines. Let us know– some we can fix, some have to match exactly.
- I don't get the brackets. Why are using them? Why not parenthesis?
  Parenthesis are for functions: `print("Hi!")` *or* `tori.left(90)`
  Brackets are for accessing part of a list or string:

Frequently Asked Questions

From lecture slips & recitation sections.

- Can I get a copy of the lecture slides and programs from lecture?
  Yes, the slides are posted on the class website.
- Can I work ahead on programs?
  Yes, you'll get the most out of lecture if you're 5 or so programs ahead. We give an extra 7-10 days on deadlines from when material is presented.
- I'm sure I did Problem 9 correctly, but Gradescope disagrees. Why?
  Some of the grading scripts are really finicky about spacing and new lines.
  Let us know– some we can fix, some have to match exactly.
- I don't get the brackets. Why are using them? Why not parenthesis?
  Parenthesis are for functions: `print("Hi!")` *or* `tori.left(90)`
  Brackets are for accessing part of a list or string: `words[1]`

Frequently Asked Questions

From lecture slips & recitation sections.

- Can I get a copy of the lecture slides and programs from lecture?
  Yes, the slides are posted on the class website.
- Can I work ahead on programs?
  Yes, you'll get the most out of lecture if you're 5 or so programs ahead. We give an extra 7-10 days on deadlines from when material is presented.
- I'm sure I did Problem 9 correctly, but Gradescope disagrees. Why?
  Some of the grading scripts are really finicky about spacing and new lines. Let us know– some we can fix, some have to match exactly.
- I don't get the brackets. Why are using them? Why not parenthesis?
  Parenthesis are for functions: `print("Hi!")` *or* `tori.left(90)`
  Brackets are for accessing part of a list or string: `words[1]` *or* `mess[3:6]`*.*

Frequently Asked Questions

From lecture slips & recitation sections.

- Can I get a copy of the lecture slides and programs from lecture?
  Yes, the slides are posted on the class website.
- Can I work ahead on programs?
  Yes, you'll get the most out of lecture if you're 5 or so programs ahead. We give an extra 7-10 days on deadlines from when material is presented.
- I'm sure I did Problem 9 correctly, but Gradescope disagrees. Why?
  Some of the grading scripts are really finicky about spacing and new lines. Let us know– some we can fix, some have to match exactly.
- I don't get the brackets. Why are using them? Why not parenthesis?
  Parenthesis are for functions: `print("Hi!")` *or* `tori.left(90)`
  Brackets are for accessing part of a list or string: `words[1]` *or* `mess[3:6]`.
- Could you explain more about arithmetic (especially modulo!) in Python?

Frequently Asked Questions

From lecture slips & recitation sections.

- Can I get a copy of the lecture slides and programs from lecture?
  Yes, the slides are posted on the class website.
- Can I work ahead on programs?
  Yes, you'll get the most out of lecture if you're 5 or so programs ahead. We give an extra 7-10 days on deadlines from when material is presented.
- I'm sure I did Problem 9 correctly, but Gradescope disagrees. Why?
  Some of the grading scripts are really finicky about spacing and new lines. Let us know– some we can fix, some have to match exactly.
- I don't get the brackets. Why are using them? Why not parenthesis?
  Parenthesis are for functions: `print("Hi!")` *or* `tori.left(90)`
  Brackets are for accessing part of a list or string: `words[1]` *or* `mess[3:6]`*.*
- Could you explain more about arithmetic (especially modulo!) in Python?
  Yes, will do! We'll start out with arithmetic.

Frequently Asked Questions

From lecture slips & recitation sections.

- Can I get a copy of the lecture slides and programs from lecture?
  Yes, the slides are posted on the class website.
- Can I work ahead on programs?
  Yes, you'll get the most out of lecture if you're 5 or so programs ahead. We give an extra 7-10 days on deadlines from when material is presented.
- I'm sure I did Problem 9 correctly, but Gradescope disagrees. Why?
  Some of the grading scripts are really finicky about spacing and new lines. Let us know– some we can fix, some have to match exactly.
- I don't get the brackets. Why are using them? Why not parenthesis?
  Parenthesis are for functions: `print("Hi!")` *or* `tori.left(90)`
  Brackets are for accessing part of a list or string: `words[1]` *or* `mess[3:6]`*.*
- Could you explain more about arithmetic (especially modulo!) in Python?
  Yes, will do! We'll start out with arithmetic.
- One more time on all the `range()` options?

Frequently Asked Questions

From lecture slips & recitation sections.

- Can I get a copy of the lecture slides and programs from lecture?
  Yes, the slides are posted on the class website.
- Can I work ahead on programs?
  Yes, you'll get the most out of lecture if you're 5 or so programs ahead. We give an extra 7-10 days on deadlines from when material is presented.
- I'm sure I did Problem 9 correctly, but Gradescope disagrees. Why?
  Some of the grading scripts are really finicky about spacing and new lines. Let us know– some we can fix, some have to match exactly.
- I don't get the brackets. Why are using them? Why not parenthesis?
  Parenthesis are for functions: `print("Hi!")` *or* `tori.left(90)`
  Brackets are for accessing part of a list or string: `words[1]` *or* `mess[3:6]`.
- Could you explain more about arithmetic (especially modulo!) in Python?
  Yes, will do! We'll start out with arithmetic.
- One more time on all the `range()` options?
  We'll have some in group work and a quick review.

Today's Topics

- Arithmetic
- Indexing and Slicing Lists
- Design Challenge: Planes
- Colors & Hexadecimal Notation

Today's Topics

- **Arithmetic**
- Indexing and Slicing Lists
- Design Challenge: Planes
- Colors & Hexadecimal Notation

Arithmetic

Some arithmetic operators in Python:

- Addition:

Arithmetic

Some arithmetic operators in Python:

- Addition: `sum = sum + 3`

Arithmetic

Some arithmetic operators in Python:

- Addition: `sum = sum + 3`
- Subtraction:

Arithmetic

Some arithmetic operators in Python:

- Addition: `sum = sum + 3`
- Subtraction: `deb = deb - item`

Arithmetic

Some arithmetic operators in Python:

- Addition: `sum = sum + 3`
- Subtraction: `deb = deb - item`
- Multiplication:

Arithmetic

Some arithmetic operators in Python:

- Addition: `sum = sum + 3`
- Subtraction: `deb = deb - item`
- Multiplication: `area = h * w`

Arithmetic

Some arithmetic operators in Python:

- Addition: `sum = sum + 3`
- Subtraction: `deb = deb - item`
- Multiplication: `area = h * w`
- Division:

Arithmetic

Some arithmetic operators in Python:

- Addition: `sum = sum + 3`
- Subtraction: `deb = deb - item`
- Multiplication: `area = h * w`
- Division: `ave = total / n`

Arithmetic

Some arithmetic operators in Python:

- Addition: `sum = sum + 3`
- Subtraction: `deb = deb - item`
- Multiplication: `area = h * w`
- Division: `ave = total / n`
- Floor or Integer Division:

Arithmetic

Some arithmetic operators in Python:

- Addition: `sum = sum + 3`
- Subtraction: `deb = deb - item`
- Multiplication: `area = h * w`
- Division: `ave = total / n`
- Floor or Integer Division:
  `weeks = totalDays // 7`

Arithmetic

Some arithmetic operators in Python:

- Addition: `sum = sum + 3`
- Subtraction: `deb = deb - item`
- Multiplication: `area = h * w`
- Division: `ave = total / n`
- Floor or Integer Division:
  `weeks = totalDays // 7`
- Remainder or Modulus:

Arithmetic

Some arithmetic operators in Python:

- Addition: `sum = sum + 3`
- Subtraction: `deb = deb - item`
- Multiplication: `area = h * w`
- Division: `ave = total / n`
- Floor or Integer Division:
  `weeks = totalDays // 7`
- Remainder or Modulus:
  `days = totalDays % 7`

Arithmetic

Some arithmetic operators in Python:

- Addition: `sum = sum + 3`
- Subtraction: `deb = deb - item`
- Multiplication: `area = h * w`
- Division: `ave = total / n`
- Floor or Integer Division: `weeks = totalDays // 7`
- Remainder or Modulus: `days = totalDays % 7`
- Exponentiaion:

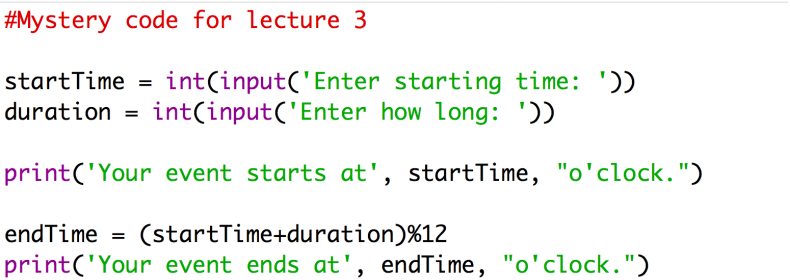
Arithmetic

Some arithmetic operators in Python:

- Addition: `sum = sum + 3`
- Subtraction: `deb = deb - item`
- Multiplication: `area = h * w`
- Division: `ave = total / n`
- Floor or Integer Division:
  `weeks = totalDays // 7`
- Remainder or Modulus:
  `days = totalDays % 7`
- Exponentiaion:
  `pop = 2**time`

In Pairs or Triples...

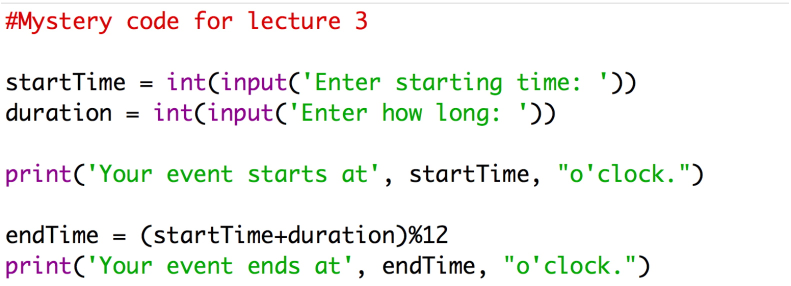
What does this code do?



```
#Mystery code for lecture 3

startTime = int(input('Enter starting time: '))
duration = int(input('Enter how long: '))

print('Your event starts at', startTime, "o'clock.")

endTime = (startTime+duration)%12
print('Your event ends at', endTime, "o'clock.")
```

In Pairs or Triples...

What does this code do?



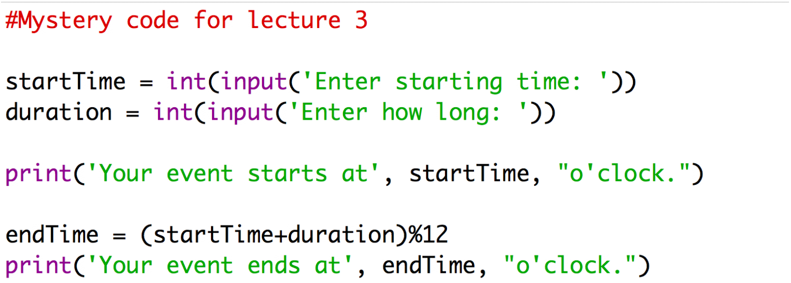
```
#Mystery code for lecture 3

startTime = int(input('Enter starting time: '))
duration = int(input('Enter how long: '))

print('Your event starts at', startTime, "o'clock.")

endTime = (startTime+duration)%12
print('Your event ends at', endTime, "o'clock.")
```

In particular, what is printed...

- If the user enters, 9 and 2.

In Pairs or Triples...

What does this code do?



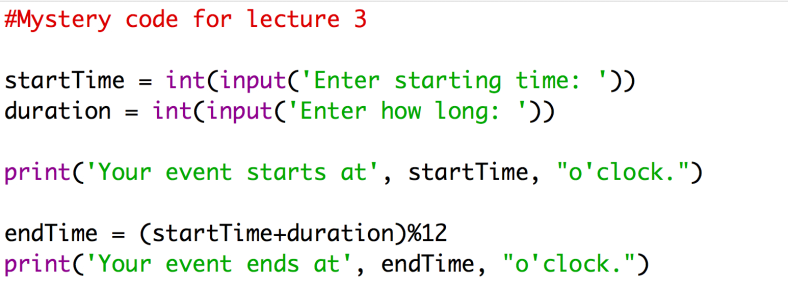
```
#Mystery code for lecture 3

startTime = int(input('Enter starting time: '))
duration = int(input('Enter how long: '))

print('Your event starts at', startTime, "o'clock.")

endTime = (startTime+duration)%12
print('Your event ends at', endTime, "o'clock.")
```

In particular, what is printed...

- If the user enters, 9 and 2.
- If the user enters, 12 and 4.

In Pairs or Triples...

What does this code do?



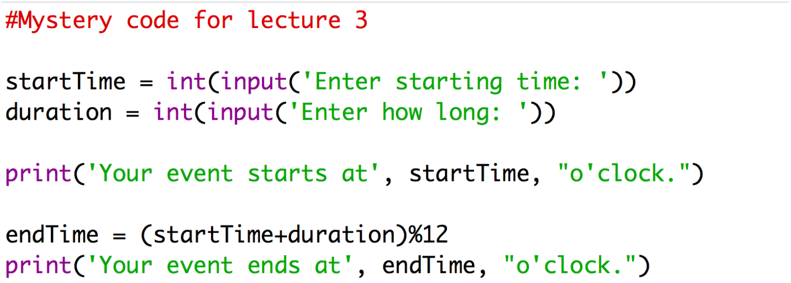
```
#Mystery code for lecture 3

startTime = int(input('Enter starting time: '))
duration = int(input('Enter how long: '))

print('Your event starts at', startTime, "o'clock.")

endTime = (startTime+duration)%12
print('Your event ends at', endTime, "o'clock.")
```

In particular, what is printed...

- If the user enters, 9 and 2.
- If the user enters, 12 and 4.
- If the user enters, 8 and 20.

In Pairs or Triples...

What does this code do?



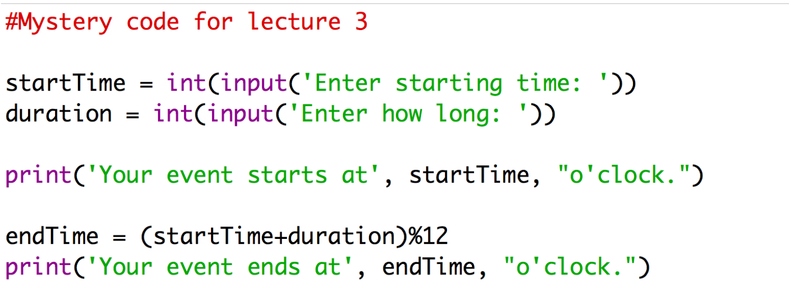
```
#Mystery code for lecture 3

startTime = int(input('Enter starting time: '))
duration = int(input('Enter how long: '))

print('Your event starts at', startTime, "o'clock.")

endTime = (startTime+duration)%12
print('Your event ends at', endTime, "o'clock.")
```

In particular, what is printed...

- If the user enters, 9 and 2.
- If the user enters, 12 and 4.
- If the user enters, 8 and 20.
- If the user enters, 11 and 1.

In Pairs or Triples...

What does this code do?



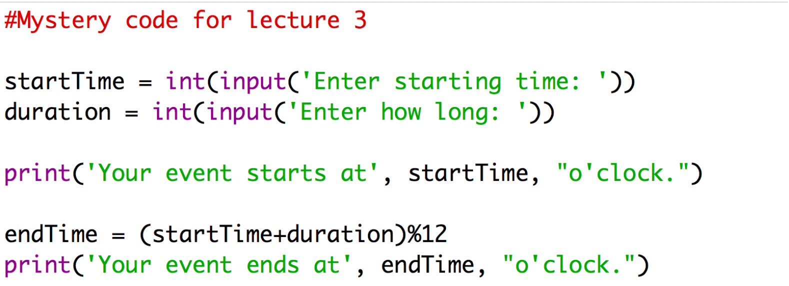
```
#Mystery code for lecture 3

startTime = int(input('Enter starting time: '))
duration = int(input('Enter how long: '))

print('Your event starts at', startTime, "o'clock.")

endTime = (startTime+duration)%12
print('Your event ends at', endTime, "o'clock.")
```

In particular, what is printed...

- If the user enters, 9 and 2.

In Pairs or Triples...

What does this code do?



```
#Mystery code for lecture 3

startTime = int(input('Enter starting time: '))
duration = int(input('Enter how long: '))

print('Your event starts at', startTime, "o'clock.")

endTime = (startTime+duration)%12
print('Your event ends at', endTime, "o'clock.")
```

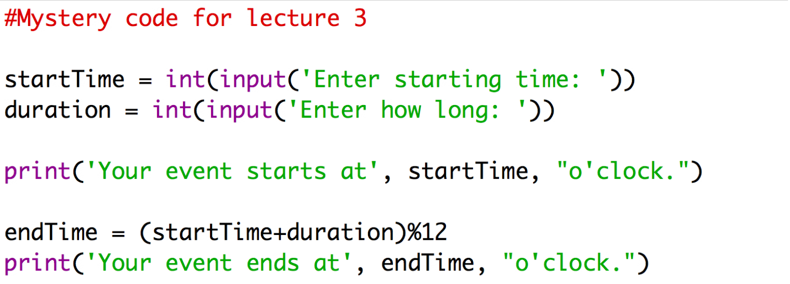
In particular, what is printed...

- If the user enters, 9 and 2.

```
Enter starting time: 9
Enter how long: 2
Your event starts at 9 o'clock.
Your event ends at 11 o'clock.
```

In Pairs or Triples...

What does this code do?



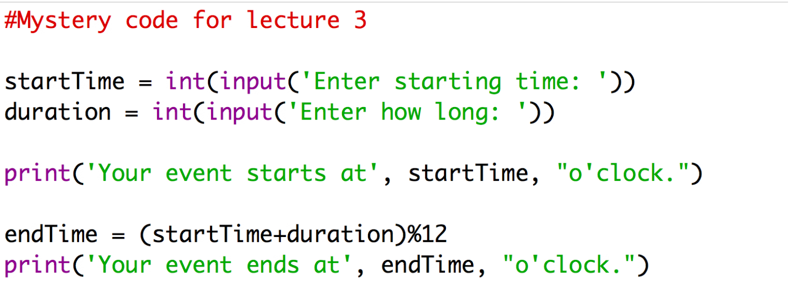
```
#Mystery code for lecture 3

startTime = int(input('Enter starting time: '))
duration = int(input('Enter how long: '))

print('Your event starts at', startTime, "o'clock.")

endTime = (startTime+duration)%12
print('Your event ends at', endTime, "o'clock.")
```

In particular, what is printed...

- If the user enters, 12 and 4.

In Pairs or Triples...

What does this code do?



```
#Mystery code for lecture 3

startTime = int(input('Enter starting time: '))
duration = int(input('Enter how long: '))

print('Your event starts at', startTime, "o'clock.")

endTime = (startTime+duration)%12
print('Your event ends at', endTime, "o'clock.")
```

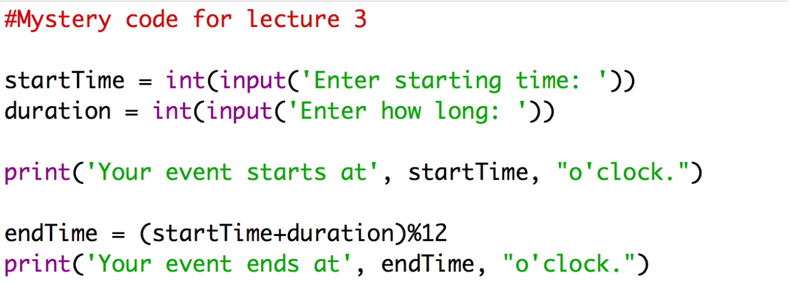
In particular, what is printed...

- If the user enters, 12 and 4.

```
Enter starting time: 12
Enter how long: 4
Your event starts at 12 o'clock.
Your event ends at 4 o'clock.
```

In Pairs or Triples...

What does this code do?



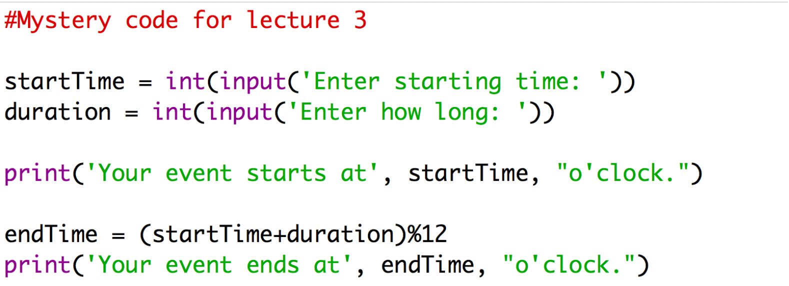
```
#Mystery code for lecture 3

startTime = int(input('Enter starting time: '))
duration = int(input('Enter how long: '))

print('Your event starts at', startTime, "o'clock.")

endTime = (startTime+duration)%12
print('Your event ends at', endTime, "o'clock.")
```

In particular, what is printed...

- If the user enters, 8 and 20.

In Pairs or Triples...

What does this code do?



```
#Mystery code for lecture 3

startTime = int(input('Enter starting time: '))
duration = int(input('Enter how long: '))

print('Your event starts at', startTime, "o'clock.")

endTime = (startTime+duration)%12
print('Your event ends at', endTime, "o'clock.")
```

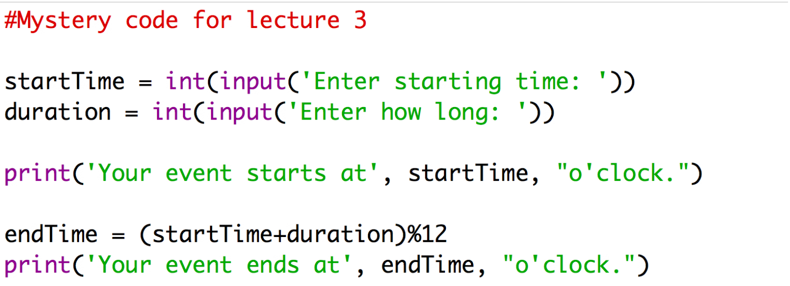
In particular, what is printed...

- If the user enters, 8 and 20.

```
Enter starting time: 8
Enter how long: 20
Your event starts at 8 o'clock.
Your event ends at 4 o'clock.
```

In Pairs or Triples...

What does this code do?



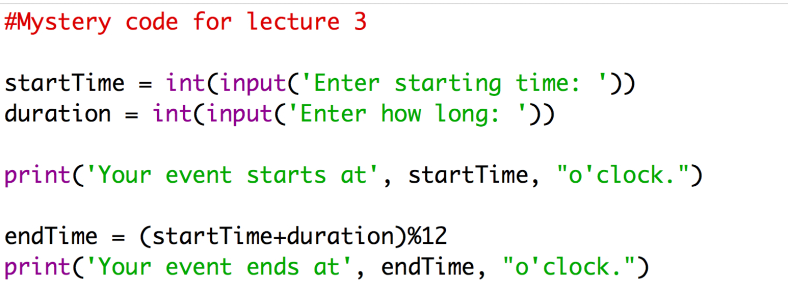
```
#Mystery code for lecture 3

startTime = int(input('Enter starting time: '))
duration = int(input('Enter how long: '))

print('Your event starts at', startTime, "o'clock.")

endTime = (startTime+duration)%12
print('Your event ends at', endTime, "o'clock.")
```

In particular, what is printed...

- If the user enters, 11 and 1.

In Pairs or Triples...

What does this code do?



```
#Mystery code for lecture 3

startTime = int(input('Enter starting time: '))
duration = int(input('Enter how long: '))

print('Your event starts at', startTime, "o'clock.")

endTime = (startTime+duration)%12
print('Your event ends at', endTime, "o'clock.")
```

In particular, what is printed...

- If the user enters, 11 and 1.

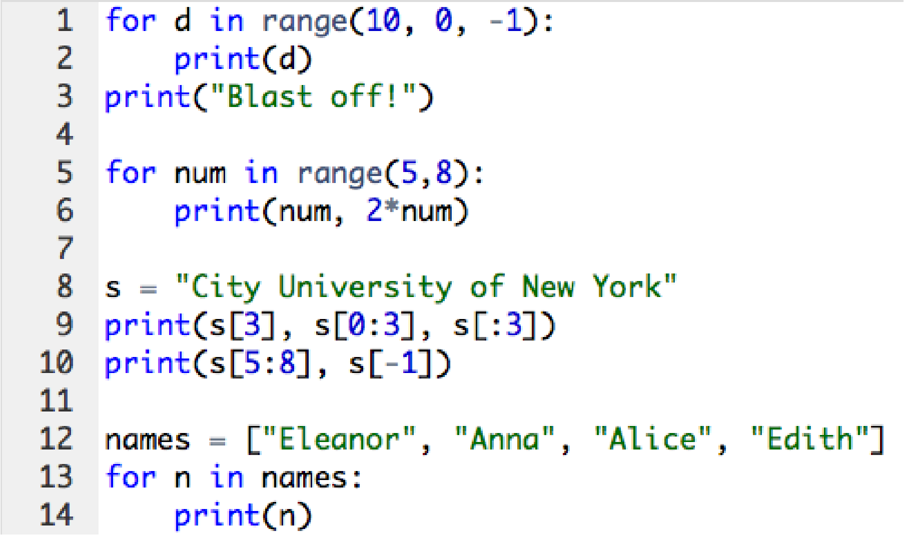
```
Enter starting time: 11
Enter how long: 1
Your event starts at 11 o'clock.
Your event ends at 0 o'clock.
```

Today's Topics

- Arithmetic
- **Indexing and Slicing Lists**
- Design Challenge: Planes
- Colors & Hexadecimal Notation

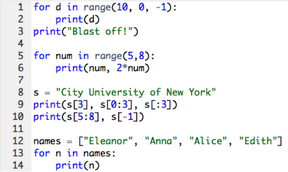
In Pairs or Triples...

Mostly review:



```
for d in range(10, 0, -1):
    print(d)
print("Blast off!")

for num in range(5,8):
    print(num, 2*num)

s = "City University of New York"
print(s[3], s[0:3], s[:3])
print(s[5:8], s[-1])

names = ["Eleanor", "Anna", "Alice", "Edith"]
for n in names:
    print(n)
```

Python Tutor



```python
for d in range(10, 0, -1):
    print(d)
print("Blast off!")

for num in range(5,8):
    print(num, 2*num)

s = "City University of New York"
print(s[3], s[0:3], s[:3])
print(s[5:8], s[-1])

names = ["Eleanor", "Anna", "Alice", "Edith"]
for n in names:
    print(n)
```

(Demo with `pythonTutor`)

Review: `range()`

The three versions:

Review: `range()`

The three versions:

- `range(stop)`

Review: range()

The three versions:

- `range(stop)`
- `range(start, stop)`

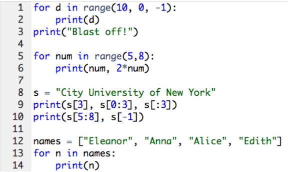
Review: `range()`

The three versions:

- `range(stop)`
- `range(start, stop)`
- `range(start, stop, step)`

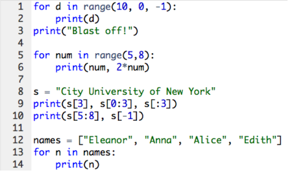
Slices

- Similar to `range()`, you can take portions or **slices** of lists and strings:



```python
for d in range(10, 0, -1):
    print(d)
print("Blast off!")

for num in range(5,8):
    print(num, 2*num)

s = "City University of New York"
print(s[3], s[0:3], s[:3])
print(s[5:8], s[-1])

names = ["Eleanor", "Anna", "Alice", "Edith"]
for n in names:
    print(n)
```

Slices



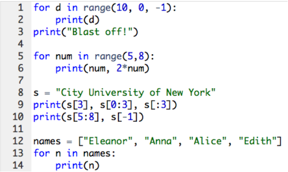
```
for d in range(10, 0, -1):
    print(d)
print("Blast off!")

for num in range(5,8):
    print(num, 2*num)

s = "City University of New York"
print(s[3], s[0:3], s[:3])
print(s[5:8], s[-1])

names = ["Eleanor", "Anna", "Alice", "Edith"]
for n in names:
    print(n)
```

- Similar to `range()`, you can take portions or **slices** of lists and strings:

  `s[5:8]`

  gives: `"Uni"`

Slices



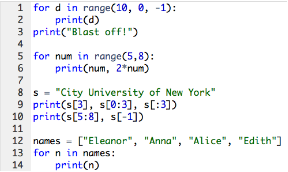
```
for d in range(10, 0, -1):
    print(d)
print("Blast off!")

for num in range(5,8):
    print(num, 2*num)

s = "City University of New York"
print(s[3], s[0:3], s[:3])
print(s[5:8], s[-1])

names = ["Eleanor", "Anna", "Alice", "Edith"]
for n in names:
    print(n)
```

- Similar to `range()`, you can take portions or **slices** of lists and strings:

  `s[5:8]`

  gives: `"Uni"`
- Also works for lists:

Slices



```
for d in range(10, 0, -1):
    print(d)
print("Blast off!")

for num in range(5,8):
    print(num, 2*num)

s = "City University of New York"
print(s[3], s[0:3], s[:3])
print(s[5:8], s[-1])

names = ["Eleanor", "Anna", "Alice", "Edith"]
for n in names:
    print(n)
```

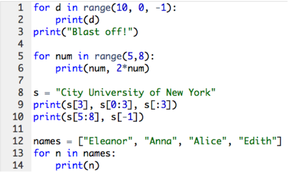
- Similar to `range()`, you can take portions or **slices** of lists and strings:

  `s[5:8]`

  gives: `"Uni"`
- Also works for lists:

  `names[1:3]`

Slices



```
for d in range(10, 0, -1):
    print(d)
print("Blast off!")

for num in range(5,8):
    print(num, 2*num)

s = "City University of New York"
print(s[3], s[0:3], s[:3])
print(s[5:8], s[-1])

names = ["Eleanor", "Anna", "Alice", "Edith"]
for n in names:
    print(n)
```

- Similar to `range()`, you can take portions or **slices** of lists and strings:

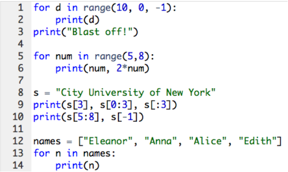
  `s[5:8]`

  gives: `"Uni"`
- Also works for lists:

  `names[1:3]`

  gives: `["Anna", "Alice"]`

Slices



```python
for d in range(10, 0, -1):
    print(d)
print("Blast off!")

for num in range(5,8):
    print(num, 2*num)

s = "City University of New York"
print(s[3], s[0:3], s[:3])
print(s[5:8], s[-1])

names = ["Eleanor", "Anna", "Alice", "Edith"]
for n in names:
    print(n)
```

- Similar to `range()`, you can take portions or **slices** of lists and strings:

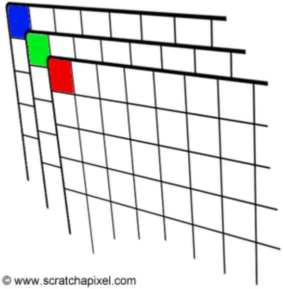
  `s[5:8]`

  gives: `"Uni"`
- Also works for lists:

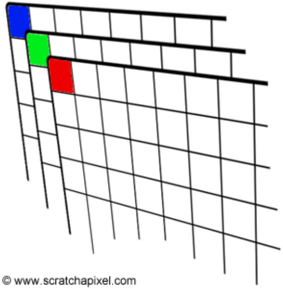
  `names[1:3]`

  gives: `["Anna", "Alice"]`
- Python also lets you "count backwards": last element has index: `-1`.

Preview: Images


© www.scratchapixel.com

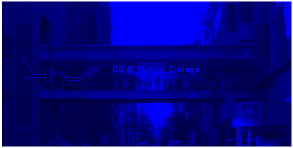
Preview: Images



© www.scratchapixel.com

img[i,j,0]

img[i,j,1]



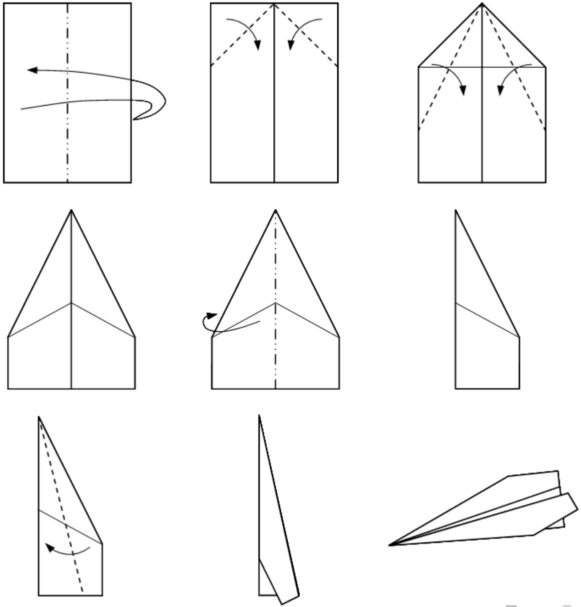
img[i,j,2]

This image has 287 rows, 573 columns, and 4 color channels (for red, green, blue, and a 4th for how transparent).

Today's Topics

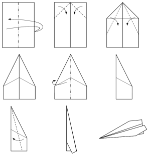
- Arithmetic
- Indexing and Slicing Lists
- **Design Challenge: Planes**
- Colors & Hexadecimal Notation

Design Challenge: Planes



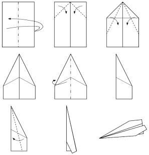
Design Challenge: Planes

- A classic write-an-algorithm challenge for introductory programming.



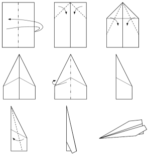
Design Challenge: Planes

- A classic write-an-algorithm challenge for introductory programming.
- With a slight twist:



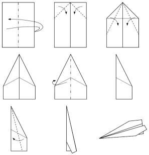
Design Challenge: Planes

- A classic write-an-algorithm challenge for introductory programming.
- With a slight twist: refining designs



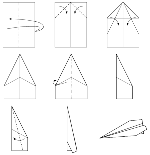
Design Challenge: Planes

- A classic write-an-algorithm challenge for introductory programming.
- With a slight twist: refining designs
    - As a team, write down your design.

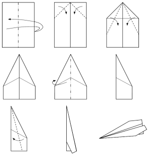


Design Challenge: Planes

- A classic write-an-algorithm challenge for introductory programming.
- With a slight twist: refining designs
  - As a team, write down your design.
  - Exchange with another team.

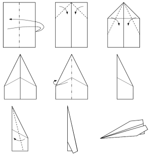


Design Challenge: Planes



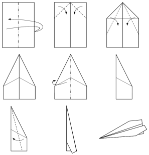
- A classic write-an-algorithm challenge for introductory programming.
- With a slight twist: refining designs
    - As a team, write down your design.
    - Exchange with another team.
    - They build an airplane to your design (test plane) **without consulting you**.

Design Challenge: Planes



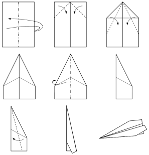
- A classic write-an-algorithm challenge for introductory programming.
- With a slight twist: refining designs
    - As a team, write down your design.
    - Exchange with another team.
    - They build an airplane to your design (test plane) **without consulting you**.
    - You exchange test planes, and **revise your algorithm**.

Design Challenge: Planes



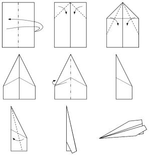
- A classic write-an-algorithm challenge for introductory programming.
- With a slight twist: refining designs
  - As a team, write down your design.
  - Exchange with another team.
  - They build an airplane to your design (test plane) **without consulting you**.
  - You exchange test planes, and **revise your algorithm**.
  - The build team makes 3 copies of your paper airplane,

Design Challenge: Planes



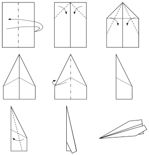
- A classic write-an-algorithm challenge for introductory programming.
- With a slight twist: refining designs
  - As a team, write down your design.
  - Exchange with another team.
  - They build an airplane to your design (test plane) **without consulting you**.
  - You exchange test planes, and **revise your algorithm**.
  - The build team makes 3 copies of your paper airplane, and flies it from the balcony (must be behind first row of seats).

Design Challenge: Planes



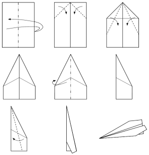
- A classic write-an-algorithm challenge for introductory programming.
- With a slight twist: refining designs
  - As a team, write down your design.
  - Exchange with another team.
  - They build an airplane to your design (test plane) **without consulting you**.
  - You exchange test planes, and **revise your algorithm**.
  - The build team makes 3 copies of your paper airplane, and flies it from the balcony (must be behind first row of seats).
  - Will be judged on closeness to the stage.

Design Challenge: Planes



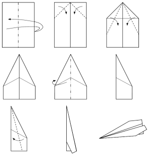
- A classic write-an-algorithm challenge for introductory programming.
- With a slight twist: refining designs
  - As a team, write down your design.
  - Exchange with another team.
  - They build an airplane to your design (test plane) **without consulting you**.
  - You exchange test planes, and **revise your algorithm**.
  - The build team makes 3 copies of your paper airplane, and flies it from the balcony (must be behind first row of seats).
  - Will be judged on closeness to the stage.
  - Winning design/build team gets chocolate.

Design Challenge: Planes



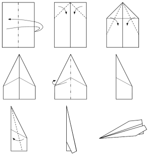
- A classic write-an-algorithm challenge for introductory programming.
- With a slight twist: refining designs
  - As a team, write down your design.
  - Exchange with another team.
  - They build an airplane to your design (test plane) **without consulting you**.
  - You exchange test planes, and **revise your algorithm**.
  - The build team makes 3 copies of your paper airplane, and flies it from the balcony (must be behind first row of seats).
  - Will be judged on closeness to the stage.
  - Winning design/build team gets chocolate.
- Remember to pick up all your airplanes!

Design Challenge: Initial Design **(2 Minutes)**



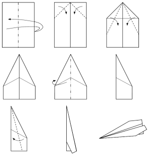
- A classic write-an-algorithm challenge for introductory programming.
- With a slight twist: refining designs
  - **As a team, write down your design.**
  - Exchange with another team.
  - They build an airplane to your design (test plane) without consulting you.
  - You exchange test planes, and revise your algorithm.
  - The build team makes 3 copies of your paper airplane, and flies it from the balcony (must be behind first row of seats).
  - Will be judged on closeness to the stage.
  - Winning design/build team gets chocolate.
- Remember to pick up all your airplanes!

Design Challenge: Test Build **(2 Minutes)**



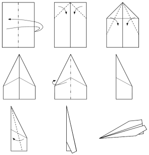
- A classic write-an-algorithm challenge for introductory programming.
- With a slight twist: refining designs
  - As a team, write down your design.
  - **Exchange with another team.**
  - **They build an airplane to your design (test plane) without consulting you.**
  - You exchange test planes, and revise your algorithm.
  - The build team makes 3 copies of your paper airplane, and flies it from the balcony (must be behind first row of seats).
  - Will be judged on closeness to the stage.
  - Winning design/build team gets chocolate.
- Remember to pick up all your airplanes!

Design Challenge: Revise Design **(3 Minutes)**



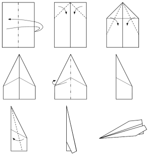
- A classic write-an-algorithm challenge for introductory programming.
- With a slight twist: refining designs
  - As a team, write down your design.
  - Exchange with another team.
  - They build an airplane to your design (test plane) without consulting you.
  - **You exchange test planes, and revise your algorithm**.
  - The build team makes 3 copies of your paper airplane, and flies it from the balcony (must be behind first row of seats).
  - Will be judged on closeness to the stage.
  - Winning design/build team gets chocolate.
- Remember to pick up all your airplanes!

Design Challenge: Build Final Planes **(2 Minutes)**



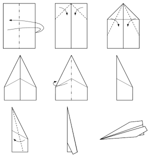
- A classic write-an-algorithm challenge for introductory programming.
- With a slight twist: refining designs
  - As a team, write down your design.
  - Exchange with another team.
  - They build an airplane to your design (test plane) without consulting you.
  - You exchange test planes, and revise your algorithm.
  - **The build team makes 3 copies of your paper airplane,** and flies it from the balcony (must be behind first row of seats).
  - Will be judged on closeness to the stage.
  - Winning design/build team gets chocolate.
- Remember to pick up all your airplanes!

Design Challenge: Test Planes **(3 Minutes)**



- A classic write-an-algorithm challenge for introductory programming.
- With a slight twist: refining designs
  - As a team, write down your design.
  - Exchange with another team.
  - They build an airplane to your design (test plane) without consulting you.
  - You exchange test planes, and revise your algorithm.
  - The build team makes 3 copies of your paper airplane, **and flies it from the balcony (must be behind first row of seats)**.
  - Will be judged on closeness to the stage.
  - Winning design/build team gets chocolate.
- Remember to pick up all your airplanes!

Design Challenge: Retrieve Planes **(2 Minutes)**

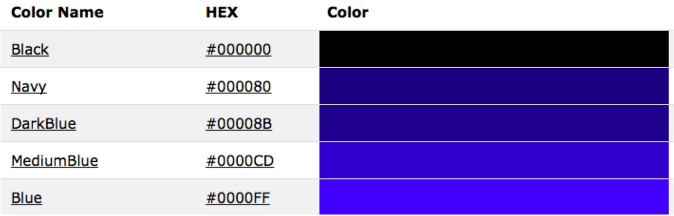


- A classic write-an-algorithm challenge for introductory programming.
- With a slight twist: refining designs
  - As a team, write down your design.
  - Exchange with another team.
  - They build an airplane to your design (test plane) without consulting you.
  - You exchange test planes, and revise your algorithm.
  - The build team makes 3 copies of your paper airplane, and flies it from the balcony (must be behind first row of seats).
  - Will be judged on closeness to the stage.
  - Winning design/build team gets chocolate.
- **Remember to pick up all your airplanes!**

Today's Topics

- Arithmetic
- Indexing and Slicing Lists
- Design Challenge: Planes
- **Colors & Hexadecimal Notation**

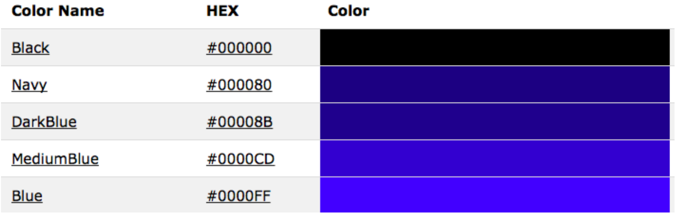
Colors



Color Name	HEX	Color
Black	#000000	⬛
Navy	#000080	🟦
DarkBlue	#00008B	🟦
MediumBlue	#0000CD	🟦
Blue	#0000FF	🟦

- Can specify by name.

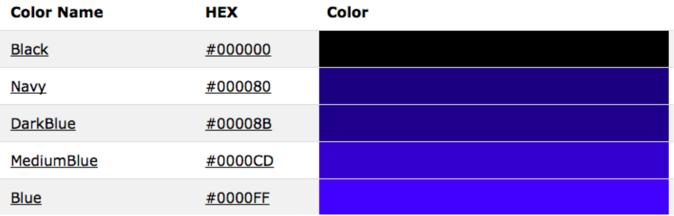
Colors



Color Name	HEX	Color
Black	#000000	■
Navy	#000080	🟦
DarkBlue	#00008B	🟦
MediumBlue	#0000CD	🟦
Blue	#0000FF	🟦

- Can specify by name.
- Can specify by numbers:

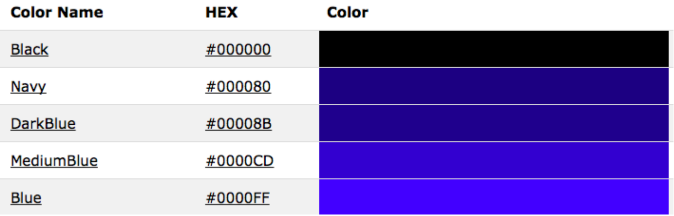
Colors



Color Name	HEX	Color
Black	#000000	⬛
Navy	#000080	🟦
DarkBlue	#00008B	🟦
MediumBlue	#0000CD	🟦
Blue	#0000FF	🟦

- Can specify by name.
- Can specify by numbers:
  - Amount of Red, Green, and Blue (RGB).

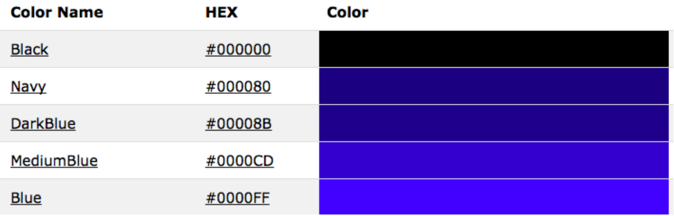
Colors



Color Name	HEX	Color
Black	#000000	⬛
Navy	#000080	🟦
DarkBlue	#00008B	🟦
MediumBlue	#0000CD	🟦
Blue	#0000FF	🟦

- Can specify by name.
- Can specify by numbers:
  - Amount of Red, Green, and Blue (RGB).
  - Adding light, not paint:

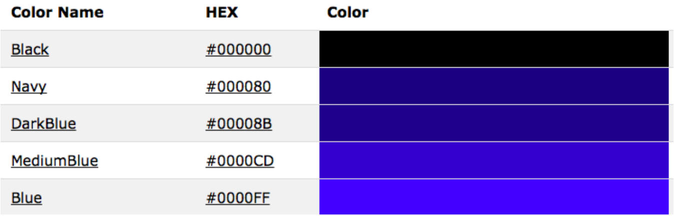
Colors



Color Name	HEX	Color
Black	#000000	⬛
Navy	#000080	🟦
DarkBlue	#00008B	🟦
MediumBlue	#0000CD	🟦
Blue	#0000FF	🟦

- Can specify by name.
- Can specify by numbers:
  - Amount of Red, Green, and Blue (RGB).
  - Adding light, not paint:
    - Black: 0% red, 0% green, 0% blue

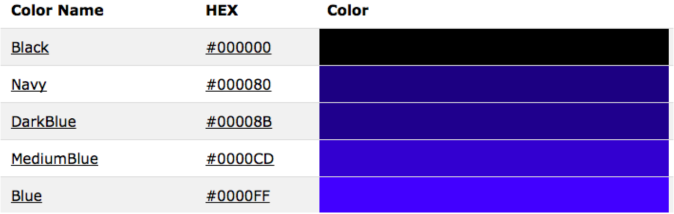
Colors



Color Name	HEX	Color
Black	#000000	⬛
Navy	#000080	🟦
DarkBlue	#00008B	🟦
MediumBlue	#0000CD	🟦
Blue	#0000FF	🟦

- Can specify by name.
- Can specify by numbers:
  - Amount of Red, Green, and Blue (RGB).
  - Adding light, not paint:
    - Black: 0% red, 0% green, 0% blue
    - White: 100% red, 100% green, 100% blue

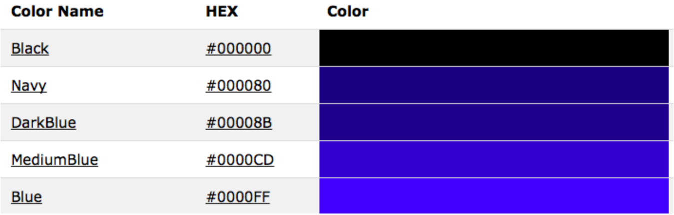
Colors



Color Name	HEX	Color
Black	#000000	⬛
Navy	#000080	🟦
DarkBlue	#00008B	🟦
MediumBlue	#0000CD	🟦
Blue	#0000FF	🟦

- Can specify by numbers (RGB):

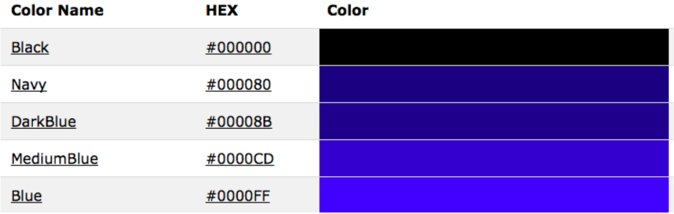
Colors



Color Name	HEX	Color
Black	#000000	⬛
Navy	#000080	🟦
DarkBlue	#00008B	🟦
MediumBlue	#0000CD	🟦
Blue	#0000FF	🟦

- Can specify by numbers (RGB):
  - Fractions of each:

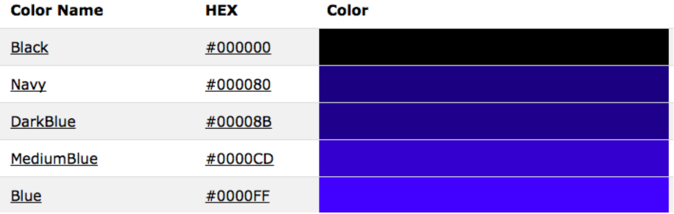
Colors



Color Name	HEX	Color
Black	#000000	⬛
Navy	#000080	🟦
DarkBlue	#00008B	🟦
MediumBlue	#0000CD	🟦
Blue	#0000FF	🟦

- Can specify by numbers (RGB):
  - Fractions of each:
    e.g. `(1.0, 0, 0)` is 100% red, no green, and no blue.

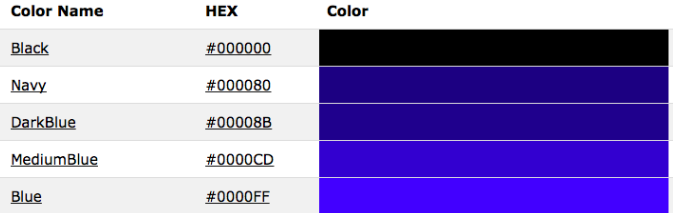
Colors



Color Name	HEX	Color
Black	#000000	⬛
Navy	#000080	🟦
DarkBlue	#00008B	🟦
MediumBlue	#0000CD	🟦
Blue	#0000FF	🟦

- Can specify by numbers (RGB):
  - Fractions of each:
    e.g. `(1.0, 0, 0)` is 100% red, no green, and no blue.
  - 8-bit colors: numbers from 0 to 255:

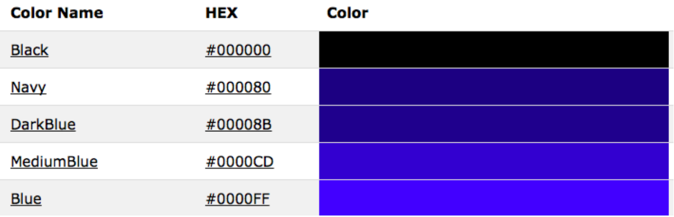
Colors



Color Name	HEX	Color
Black	#000000	⬛
Navy	#000080	🟦
DarkBlue	#00008B	🟦
MediumBlue	#0000CD	🟦
Blue	#0000FF	🟦

- Can specify by numbers (RGB):
  - Fractions of each:
    e.g. `(1.0, 0, 0)` is 100% red, no green, and no blue.
  - 8-bit colors: numbers from 0 to 255:
    e.g. `(0, 255, 0)` is no red, 100% green, and no blue.

Colors

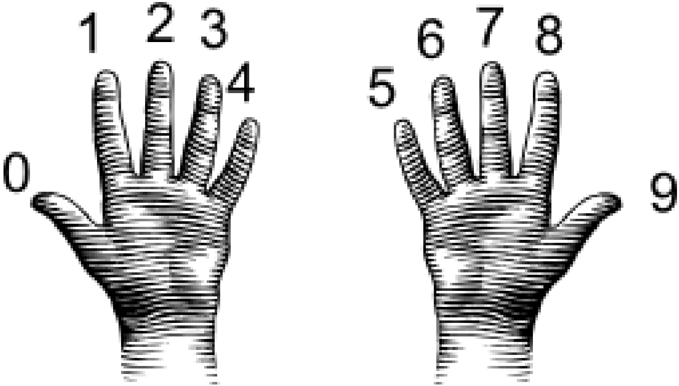


Color Name	HEX	Color
Black	#000000	⬛
Navy	#000080	🟦
DarkBlue	#00008B	🟦
MediumBlue	#0000CD	🟦
Blue	#0000FF	🟦

- Can specify by numbers (RGB):
  - Fractions of each:
    e.g. `(1.0, 0, 0)` is 100% red, no green, and no blue.
  - 8-bit colors: numbers from 0 to 255:
    e.g. `(0, 255, 0)` is no red, 100% green, and no blue.
  - Hexcodes (base-16 numbers)...

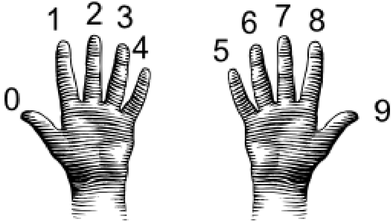
Decimal & Hexadecimal Numbers

Counting with 10 digits:



(from i-programmer.info)

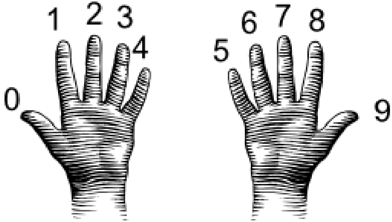
Decimal



(from i-programmer.info)

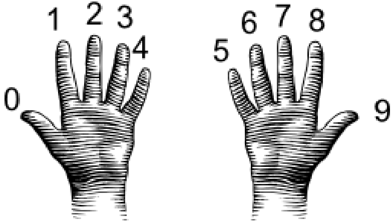
Decimal

00 01 02 03 04 05 06 07 08 09



(from i-programmer.info)

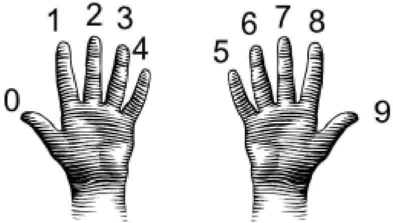
Decimal



(from i-programmer.info)

```
00 01 02 03 04 05 06 07 08 09
10 11 12 13 14 15 16 17 18 19
```

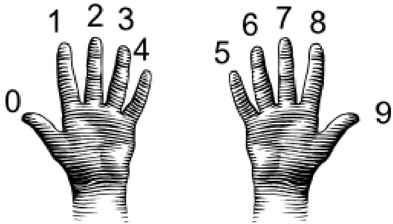
Decimal



(from i-programmer.info)

00 01 02 03 04 05 06 07 08 09
10 11 12 13 14 15 16 17 18 19
20 21 22 23 24 25 26 27 28 29

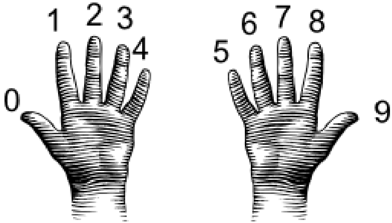
Decimal



(from i-programmer.info)

00	01	02	03	04	05	06	07	08	09
10	11	12	13	14	15	16	17	18	19
20	21	22	23	24	25	26	27	28	29
30	31	32	33	34	35	36	37	38	39

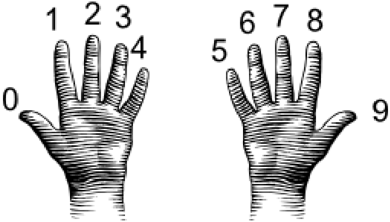
Decimal



(from i-programmer.info)

```
00 01 02 03 04 05 06 07 08 09
10 11 12 13 14 15 16 17 18 19
20 21 22 23 24 25 26 27 28 29
30 31 32 33 34 35 36 37 38 39
40 41 42 43 44 45 46 47 48 49
```

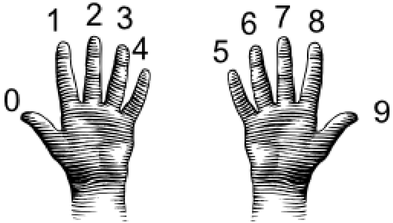
Decimal



(from i-programmer.info)

00	01	02	03	04	05	06	07	08	09
10	11	12	13	14	15	16	17	18	19
20	21	22	23	24	25	26	27	28	29
30	31	32	33	34	35	36	37	38	39
40	41	42	43	44	45	46	47	48	49
50	51	52	53	54	55	56	57	58	59

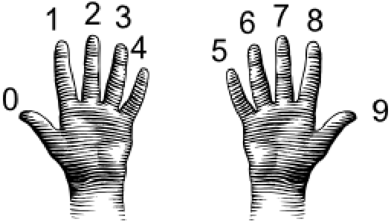
Decimal



(from i-programmer.info)

```
00 01 02 03 04 05 06 07 08 09
10 11 12 13 14 15 16 17 18 19
20 21 22 23 24 25 26 27 28 29
30 31 32 33 34 35 36 37 38 39
40 41 42 43 44 45 46 47 48 49
50 51 52 53 54 55 56 57 58 59
60 61 62 63 64 65 66 67 68 69
```

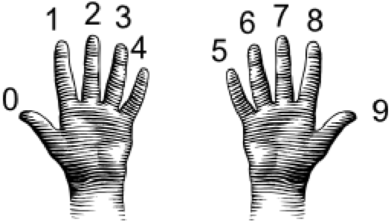
Decimal



(from i-programmer.info)

00	01	02	03	04	05	06	07	08	09
10	11	12	13	14	15	16	17	18	19
20	21	22	23	24	25	26	27	28	29
30	31	32	33	34	35	36	37	38	39
40	41	42	43	44	45	46	47	48	49
50	51	52	53	54	55	56	57	58	59
60	61	62	63	64	65	66	67	68	69
70	71	72	73	74	75	76	77	78	79

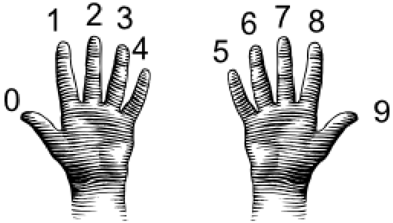
Decimal



(from i-programmer.info)

00	01	02	03	04	05	06	07	08	09
10	11	12	13	14	15	16	17	18	19
20	21	22	23	24	25	26	27	28	29
30	31	32	33	34	35	36	37	38	39
40	41	42	43	44	45	46	47	48	49
50	51	52	53	54	55	56	57	58	59
60	61	62	63	64	65	66	67	68	69
70	71	72	73	74	75	76	77	78	79
80	81	82	83	84	85	86	87	88	89

Decimal

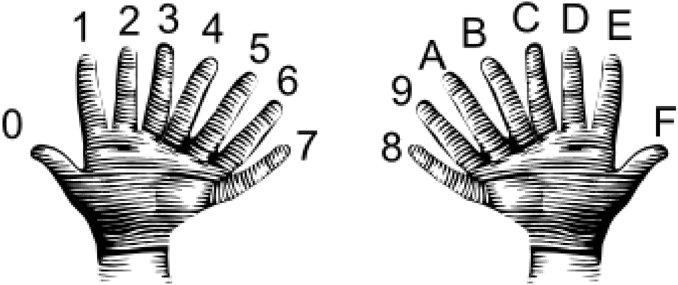


(from i-programmer.info)

```
00 01 02 03 04 05 06 07 08 09
10 11 12 13 14 15 16 17 18 19
20 21 22 23 24 25 26 27 28 29
30 31 32 33 34 35 36 37 38 39
40 41 42 43 44 45 46 47 48 49
50 51 52 53 54 55 56 57 58 59
60 61 62 63 64 65 66 67 68 69
70 71 72 73 74 75 76 77 78 79
80 81 82 83 84 85 86 87 88 89
90 91 92 93 94 95 96 97 98 99
```

Decimal & Hexadecimal Numbers

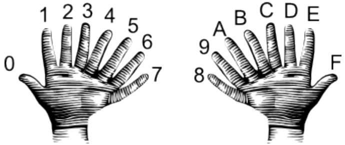
Counting with 16 digits:



(from i-programmer.info)

Hexadecimal

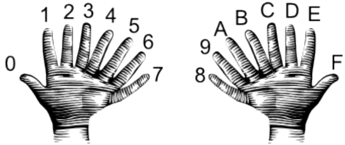
```
00 01 02 03 04 05 06 07 08 09 0A 0B 0C 0D 0E 0F
```



(from i-programmer.info)

Hexadecimal

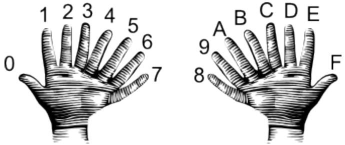
```
00 01 02 03 04 05 06 07 08 09 0A 0B 0C 0D 0E 0F
10 11 12 13 14 15 16 17 18 19 1A 1B 1C 1D 1E 1F
```



(from i-programmer.info)

Hexadecimal

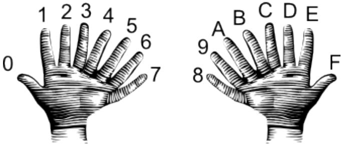
```
00 01 02 03 04 05 06 07 08 09 0A 0B 0C 0D 0E 0F
10 11 12 13 14 15 16 17 18 19 1A 1B 1C 1D 1E 1F
20 21 22 23 24 25 26 27 28 29 2A 2B 2C 2D 2E 2F
```



(from i-programmer.info)

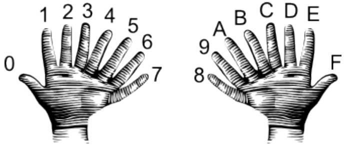
Hexadecimal

```
00 01 02 03 04 05 06 07 08 09 0A 0B 0C 0D 0E 0F
10 11 12 13 14 15 16 17 18 19 1A 1B 1C 1D 1E 1F
20 21 22 23 24 25 26 27 28 29 2A 2B 2C 2D 2E 2F
30 31 32 33 34 35 36 37 38 39 3A 3B 3C 3D 3E 3F
```



(from i-programmer.info)

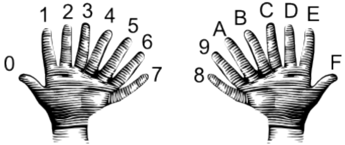
Hexadecimal



(from i-programmer.info)

```
00 01 02 03 04 05 06 07 08 09 0A 0B 0C 0D 0E 0F
10 11 12 13 14 15 16 17 18 19 1A 1B 1C 1D 1E 1F
20 21 22 23 24 25 26 27 28 29 2A 2B 2C 2D 2E 2F
30 31 32 33 34 35 36 37 38 39 3A 3B 3C 3D 3E 3F
40 41 42 43 44 45 46 47 48 49 4A 4B 4C 4D 4E 4F
```

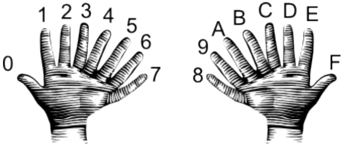
Hexadecimal



(from i-programmer.info)

```
00 01 02 03 04 05 06 07 08 09 0A 0B 0C 0D 0E 0F
10 11 12 13 14 15 16 17 18 19 1A 1B 1C 1D 1E 1F
20 21 22 23 24 25 26 27 28 29 2A 2B 2C 2D 2E 2F
30 31 32 33 34 35 36 37 38 39 3A 3B 3C 3D 3E 3F
40 41 42 43 44 45 46 47 48 49 4A 4B 4C 4D 4E 4F
50 51 52 53 54 55 56 57 58 59 5A 5B 5C 5D 5E 5F
```

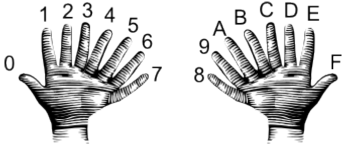
Hexadecimal



(from i-programmer.info)

```
00 01 02 03 04 05 06 07 08 09 0A 0B 0C 0D 0E 0F
10 11 12 13 14 15 16 17 18 19 1A 1B 1C 1D 1E 1F
20 21 22 23 24 25 26 27 28 29 2A 2B 2C 2D 2E 2F
30 31 32 33 34 35 36 37 38 39 3A 3B 3C 3D 3E 3F
40 41 42 43 44 45 46 47 48 49 4A 4B 4C 4D 4E 4F
50 51 52 53 54 55 56 57 58 59 5A 5B 5C 5D 5E 5F
60 61 62 63 64 65 66 67 68 69 6A 6B 6C 6D 6E 6F
```

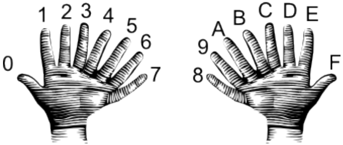
Hexadecimal



(from i-programmer.info)

```
00 01 02 03 04 05 06 07 08 09 0A 0B 0C 0D 0E 0F
10 11 12 13 14 15 16 17 18 19 1A 1B 1C 1D 1E 1F
20 21 22 23 24 25 26 27 28 29 2A 2B 2C 2D 2E 2F
30 31 32 33 34 35 36 37 38 39 3A 3B 3C 3D 3E 3F
40 41 42 43 44 45 46 47 48 49 4A 4B 4C 4D 4E 4F
50 51 52 53 54 55 56 57 58 59 5A 5B 5C 5D 5E 5F
60 61 62 63 64 65 66 67 68 69 6A 6B 6C 6D 6E 6F
70 71 72 73 74 75 76 77 78 79 7A 7B 7C 7D 7E 7F
```

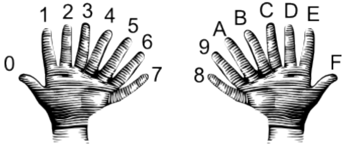
Hexadecimal



(from i-programmer.info)

```
00 01 02 03 04 05 06 07 08 09 0A 0B 0C 0D 0E 0F
10 11 12 13 14 15 16 17 18 19 1A 1B 1C 1D 1E 1F
20 21 22 23 24 25 26 27 28 29 2A 2B 2C 2D 2E 2F
30 31 32 33 34 35 36 37 38 39 3A 3B 3C 3D 3E 3F
40 41 42 43 44 45 46 47 48 49 4A 4B 4C 4D 4E 4F
50 51 52 53 54 55 56 57 58 59 5A 5B 5C 5D 5E 5F
60 61 62 63 64 65 66 67 68 69 6A 6B 6C 6D 6E 6F
70 71 72 73 74 75 76 77 78 79 7A 7B 7C 7D 7E 7F
80 81 82 83 84 85 86 87 88 89 8A 8B 8C 8D 8E 8F
```

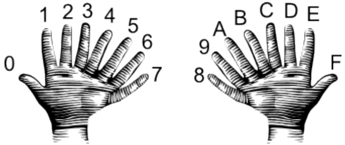
Hexadecimal



(from i-programmer.info)

```
00 01 02 03 04 05 06 07 08 09 0A 0B 0C 0D 0E 0F
10 11 12 13 14 15 16 17 18 19 1A 1B 1C 1D 1E 1F
20 21 22 23 24 25 26 27 28 29 2A 2B 2C 2D 2E 2F
30 31 32 33 34 35 36 37 38 39 3A 3B 3C 3D 3E 3F
40 41 42 43 44 45 46 47 48 49 4A 4B 4C 4D 4E 4F
50 51 52 53 54 55 56 57 58 59 5A 5B 5C 5D 5E 5F
60 61 62 63 64 65 66 67 68 69 6A 6B 6C 6D 6E 6F
70 71 72 73 74 75 76 77 78 79 7A 7B 7C 7D 7E 7F
80 81 82 83 84 85 86 87 88 89 8A 8B 8C 8D 8E 8F
90 91 92 93 94 95 96 97 98 99 9A 9B 9C 9D 9E 9F
```

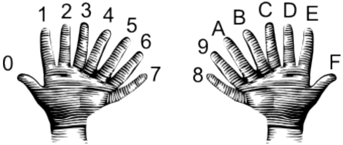
Hexadecimal



(from i-programmer.info)

```
00 01 02 03 04 05 06 07 08 09 0A 0B 0C 0D 0E 0F
10 11 12 13 14 15 16 17 18 19 1A 1B 1C 1D 1E 1F
20 21 22 23 24 25 26 27 28 29 2A 2B 2C 2D 2E 2F
30 31 32 33 34 35 36 37 38 39 3A 3B 3C 3D 3E 3F
40 41 42 43 44 45 46 47 48 49 4A 4B 4C 4D 4E 4F
50 51 52 53 54 55 56 57 58 59 5A 5B 5C 5D 5E 5F
60 61 62 63 64 65 66 67 68 69 6A 6B 6C 6D 6E 6F
70 71 72 73 74 75 76 77 78 79 7A 7B 7C 7D 7E 7F
80 81 82 83 84 85 86 87 88 89 8A 8B 8C 8D 8E 8F
90 91 92 93 94 95 96 97 98 99 9A 9B 9C 9D 9E 9F
A0 A1 A2 A3 A4 A5 A6 A7 A8 A9 AA AB AC AD AE AF
```

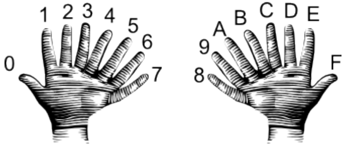
Hexadecimal



(from i-programmer.info)

00	01	02	03	04	05	06	07	08	09	0A	0B	0C	0D	0E	0F
10	11	12	13	14	15	16	17	18	19	1A	1B	1C	1D	1E	1F
20	21	22	23	24	25	26	27	28	29	2A	2B	2C	2D	2E	2F
30	31	32	33	34	35	36	37	38	39	3A	3B	3C	3D	3E	3F
40	41	42	43	44	45	46	47	48	49	4A	4B	4C	4D	4E	4F
50	51	52	53	54	55	56	57	58	59	5A	5B	5C	5D	5E	5F
60	61	62	63	64	65	66	67	68	69	6A	6B	6C	6D	6E	6F
70	71	72	73	74	75	76	77	78	79	7A	7B	7C	7D	7E	7F
80	81	82	83	84	85	86	87	88	89	8A	8B	8C	8D	8E	8F
90	91	92	93	94	95	96	97	98	99	9A	9B	9C	9D	9E	9F
A0	A1	A2	A3	A4	A5	A6	A7	A8	A9	AA	AB	AC	AD	AE	AF
B0	B1	B2	B3	B4	B5	B6	B7	B8	B9	BA	BB	BC	BD	BE	BF

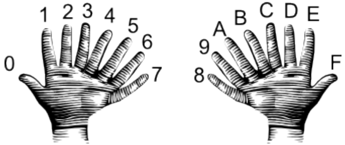
Hexadecimal



(from i-programmer.info)

00	01	02	03	04	05	06	07	08	09	0A	0B	0C	0D	0E	0F
10	11	12	13	14	15	16	17	18	19	1A	1B	1C	1D	1E	1F
20	21	22	23	24	25	26	27	28	29	2A	2B	2C	2D	2E	2F
30	31	32	33	34	35	36	37	38	39	3A	3B	3C	3D	3E	3F
40	41	42	43	44	45	46	47	48	49	4A	4B	4C	4D	4E	4F
50	51	52	53	54	55	56	57	58	59	5A	5B	5C	5D	5E	5F
60	61	62	63	64	65	66	67	68	69	6A	6B	6C	6D	6E	6F
70	71	72	73	74	75	76	77	78	79	7A	7B	7C	7D	7E	7F
80	81	82	83	84	85	86	87	88	89	8A	8B	8C	8D	8E	8F
90	91	92	93	94	95	96	97	98	99	9A	9B	9C	9D	9E	9F
A0	A1	A2	A3	A4	A5	A6	A7	A8	A9	AA	AB	AC	AD	AE	AF
B0	B1	B2	B3	B4	B5	B6	B7	B8	B9	BA	BB	BC	BD	BE	BF
C0	C1	C2	C3	C4	C5	C6	C7	C8	C9	CA	CB	CC	CD	CE	CF

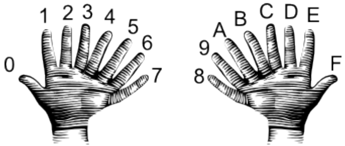
Hexadecimal



(from i-programmer.info)

```
00 01 02 03 04 05 06 07 08 09 0A 0B 0C 0D 0E 0F
10 11 12 13 14 15 16 17 18 19 1A 1B 1C 1D 1E 1F
20 21 22 23 24 25 26 27 28 29 2A 2B 2C 2D 2E 2F
30 31 32 33 34 35 36 37 38 39 3A 3B 3C 3D 3E 3F
40 41 42 43 44 45 46 47 48 49 4A 4B 4C 4D 4E 4F
50 51 52 53 54 55 56 57 58 59 5A 5B 5C 5D 5E 5F
60 61 62 63 64 65 66 67 68 69 6A 6B 6C 6D 6E 6F
70 71 72 73 74 75 76 77 78 79 7A 7B 7C 7D 7E 7F
80 81 82 83 84 85 86 87 88 89 8A 8B 8C 8D 8E 8F
90 91 92 93 94 95 96 97 98 99 9A 9B 9C 9D 9E 9F
A0 A1 A2 A3 A4 A5 A6 A7 A8 A9 AA AB AC AD AE AF
B0 B1 B2 B3 B4 B5 B6 B7 B8 B9 BA BB BC BD BE BF
C0 C1 C2 C3 C4 C5 C6 C7 C8 C9 CA CB CC CD CE CF
D0 D1 D2 D3 D4 D5 D6 D7 D8 D9 DA DB DC DD DE DF
```

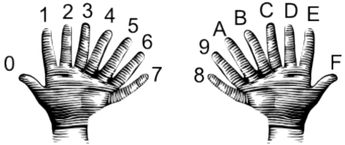
Hexadecimal



(from i-programmer.info)

```
00 01 02 03 04 05 06 07 08 09 0A 0B 0C 0D 0E 0F
10 11 12 13 14 15 16 17 18 19 1A 1B 1C 1D 1E 1F
20 21 22 23 24 25 26 27 28 29 2A 2B 2C 2D 2E 2F
30 31 32 33 34 35 36 37 38 39 3A 3B 3C 3D 3E 3F
40 41 42 43 44 45 46 47 48 49 4A 4B 4C 4D 4E 4F
50 51 52 53 54 55 56 57 58 59 5A 5B 5C 5D 5E 5F
60 61 62 63 64 65 66 67 68 69 6A 6B 6C 6D 6E 6F
70 71 72 73 74 75 76 77 78 79 7A 7B 7C 7D 7E 7F
80 81 82 83 84 85 86 87 88 89 8A 8B 8C 8D 8E 8F
90 91 92 93 94 95 96 97 98 99 9A 9B 9C 9D 9E 9F
A0 A1 A2 A3 A4 A5 A6 A7 A8 A9 AA AB AC AD AE AF
B0 B1 B2 B3 B4 B5 B6 B7 B8 B9 BA BB BC BD BE BF
C0 C1 C2 C3 C4 C5 C6 C7 C8 C9 CA CB CC CD CE CF
D0 D1 D2 D3 D4 D5 D6 D7 D8 D9 DA DB DC DD DE DF
E0 E1 E2 E3 E4 E5 E6 E7 E8 E9 EA EB EC ED EE EF
```

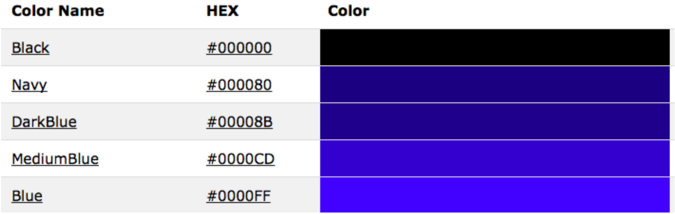
Hexadecimal



(from i-programmer.info)

```
00 01 02 03 04 05 06 07 08 09 0A 0B 0C 0D 0E 0F
10 11 12 13 14 15 16 17 18 19 1A 1B 1C 1D 1E 1F
20 21 22 23 24 25 26 27 28 29 2A 2B 2C 2D 2E 2F
30 31 32 33 34 35 36 37 38 39 3A 3B 3C 3D 3E 3F
40 41 42 43 44 45 46 47 48 49 4A 4B 4C 4D 4E 4F
50 51 52 53 54 55 56 57 58 59 5A 5B 5C 5D 5E 5F
60 61 62 63 64 65 66 67 68 69 6A 6B 6C 6D 6E 6F
70 71 72 73 74 75 76 77 78 79 7A 7B 7C 7D 7E 7F
80 81 82 83 84 85 86 87 88 89 8A 8B 8C 8D 8E 8F
90 91 92 93 94 95 96 97 98 99 9A 9B 9C 9D 9E 9F
A0 A1 A2 A3 A4 A5 A6 A7 A8 A9 AA AB AC AD AE AF
B0 B1 B2 B3 B4 B5 B6 B7 B8 B9 BA BB BC BD BE BF
C0 C1 C2 C3 C4 C5 C6 C7 C8 C9 CA CB CC CD CE CF
D0 D1 D2 D3 D4 D5 D6 D7 D8 D9 DA DB DC DD DE DF
E0 E1 E2 E3 E4 E5 E6 E7 E8 E9 EA EB EC ED EE EF
F0 F1 F2 F3 F4 F5 F6 F7 F8 F9 FA FB FC FD FE FF
```

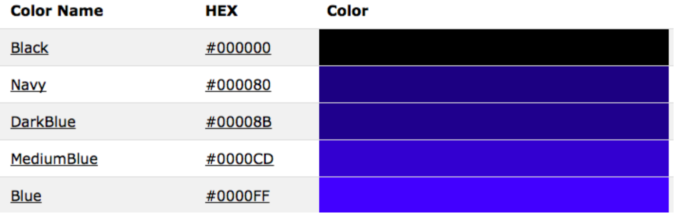
Colors



Color Name	HEX	Color
Black	#000000	⬛
Navy	#000080	🟦
DarkBlue	#00008B	🟦
MediumBlue	#0000CD	🟦
Blue	#0000FF	🟦

- Can specify by numbers (RGB):
    - Fractions of each:
      e.g. `(1.0, 0, 0)` is 100% red, no green, and no blue.
    - 8-bit colors: numbers from 0 to 255:
      e.g. `(0, 255, 0)` is no red, 100% green, and no blue.
    - Hexcodes (base-16 numbers):

Colors

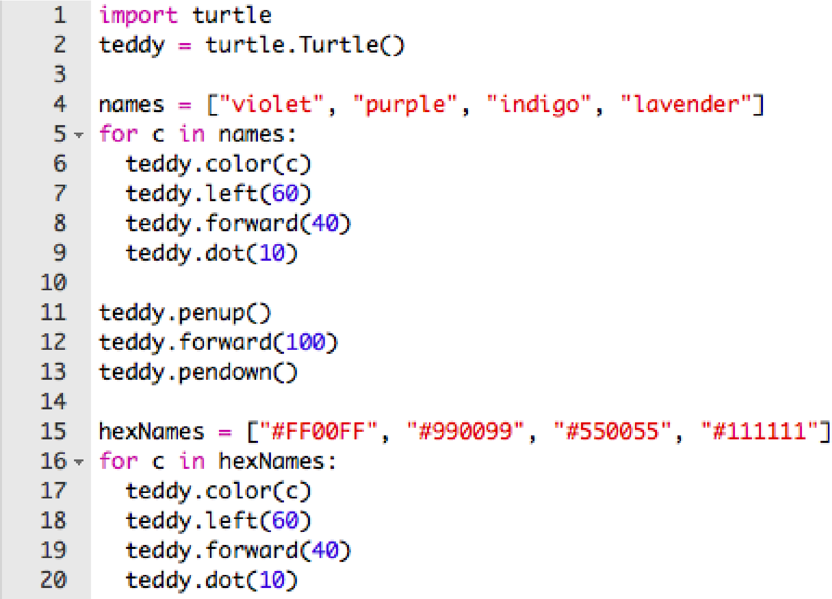


Color Name	HEX	Color
Black	#000000	⬛
Navy	#000080	🟦
DarkBlue	#00008B	🟦
MediumBlue	#0000CD	🟦
Blue	#0000FF	🟦

- Can specify by numbers (RGB):
  - Fractions of each:
    e.g. `(1.0, 0, 0)` is 100% red, no green, and no blue.
  - 8-bit colors: numbers from 0 to 255:
    e.g. `(0, 255, 0)` is no red, 100% green, and no blue.
  - Hexcodes (base-16 numbers):
    e.g. `#0000FF` is no red, no green, and 100% blue.

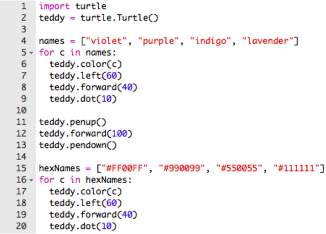
In Pairs or Triples...

Some review and some novel challenges:



```
import turtle
teddy = turtle.Turtle()

names = ["violet", "purple", "indigo", "lavender"]
for c in names:
  teddy.color(c)
  teddy.left(60)
  teddy.forward(40)
  teddy.dot(10)

teddy.penup()
teddy.forward(100)
teddy.pendown()

hexNames = ["#FF00FF", "#990099", "#550055", "#111111"]
for c in hexNames:
  teddy.color(c)
  teddy.left(60)
  teddy.forward(40)
  teddy.dot(10)
```

Trinkets



```
import turtle
teddy = turtle.Turtle()

names = ["violet", "purple", "indigo", "lavender"]
for c in names:
  teddy.color(c)
  teddy.left(60)
  teddy.forward(40)
  teddy.dot(10)

teddy.penup()
teddy.forward(100)
teddy.pendown()

hexNames = ["#FF00FF", "#990099", "#550055", "#111111"]
for c in hexNames:
  teddy.color(c)
  teddy.left(60)
  teddy.forward(40)
  teddy.dot(10)
```

(Demo with `trinkets`)

Today's Topics

- Arithmetic
- Indexing and Slicing Lists
- **Design Challenge: Planes**
- Colors & Hexadecimal Notation

Today's Topics

- Arithmetic
- Indexing and Slicing Lists
- Design Challenge: Planes
- **Colors & Hexadecimal Notation**

Recap

- On lecture slip, write down a topic you wish we had spent more time (and why).

Recap

- On lecture slip, write down a topic you wish we had spent more time (and why).
- In Python, we introduced:

Recap

- On lecture slip, write down a topic you wish we had spent more time (and why).
- In Python, we introduced:
  - Indexing and Slicing Lists

Recap

- On lecture slip, write down a topic you wish we had spent more time (and why).
- In Python, we introduced:
    - Indexing and Slicing Lists
    - Colors

Recap

- On lecture slip, write down a topic you wish we had spent more time (and why).
- In Python, we introduced:
  - Indexing and Slicing Lists
  - Colors
  - Hexadecimal Notation

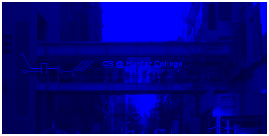
Recap

- On lecture slip, write down a topic you wish we had spent more time (and why).
- In Python, we introduced:
  - Indexing and Slicing Lists
  - Colors
  - Hexadecimal Notation
- Pass your lecture slips to the end of the rows for the UTA's to collect.

Practice Quiz & Final Questions

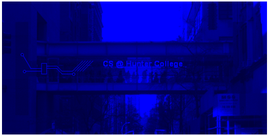
- Since you must pass the final exam to pass the course, we end every lecture with final exam review.

Practice Quiz & Final Questions



- Since you must pass the final exam to pass the course, we end every lecture with final exam review.
- Pull out something to write on (not to be turned in).

Practice Quiz & Final Questions



- Since you must pass the final exam to pass the course, we end every lecture with final exam review.
- Pull out something to write on (not to be turned in).
- Lightning rounds:

Practice Quiz & Final Questions

- Since you must pass the final exam to pass the course, we end every lecture with final exam review.
- Pull out something to write on (not to be turned in).
- Lightning rounds:
    - write as much you can for 60 seconds;

Practice Quiz & Final Questions

- Since you must pass the final exam to pass the course, we end every lecture with final exam review.
- Pull out something to write on (not to be turned in).
- Lightning rounds:
  - write as much you can for 60 seconds;
  - followed by answer; and

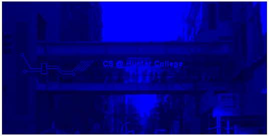
Practice Quiz & Final Questions

- Since you must pass the final exam to pass the course, we end every lecture with final exam review.
- Pull out something to write on (not to be turned in).
- Lightning rounds:
  - write as much you can for 60 seconds;
  - followed by answer; and
  - repeat.

Practice Quiz & Final Questions

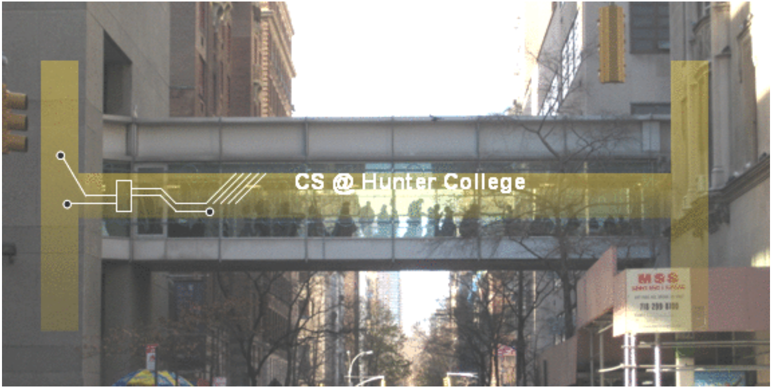
- Since you must pass the final exam to pass the course, we end every lecture with final exam review.
- Pull out something to write on (not to be turned in).
- Lightning rounds:
  - write as much you can for 60 seconds;
  - followed by answer; and
  - repeat.
- Past exams are on the webpage (under Final Exam Information).

Practice Quiz & Final Questions



- Since you must pass the final exam to pass the course, we end every lecture with final exam review.
- Pull out something to write on (not to be turned in).
- Lightning rounds:
  - write as much you can for 60 seconds;
  - followed by answer; and
  - repeat.
- Past exams are on the webpage (under Final Exam Information).
- We're starting with Fall 2017, Version 2.

Writing Boards



- Return writing boards as you leave...