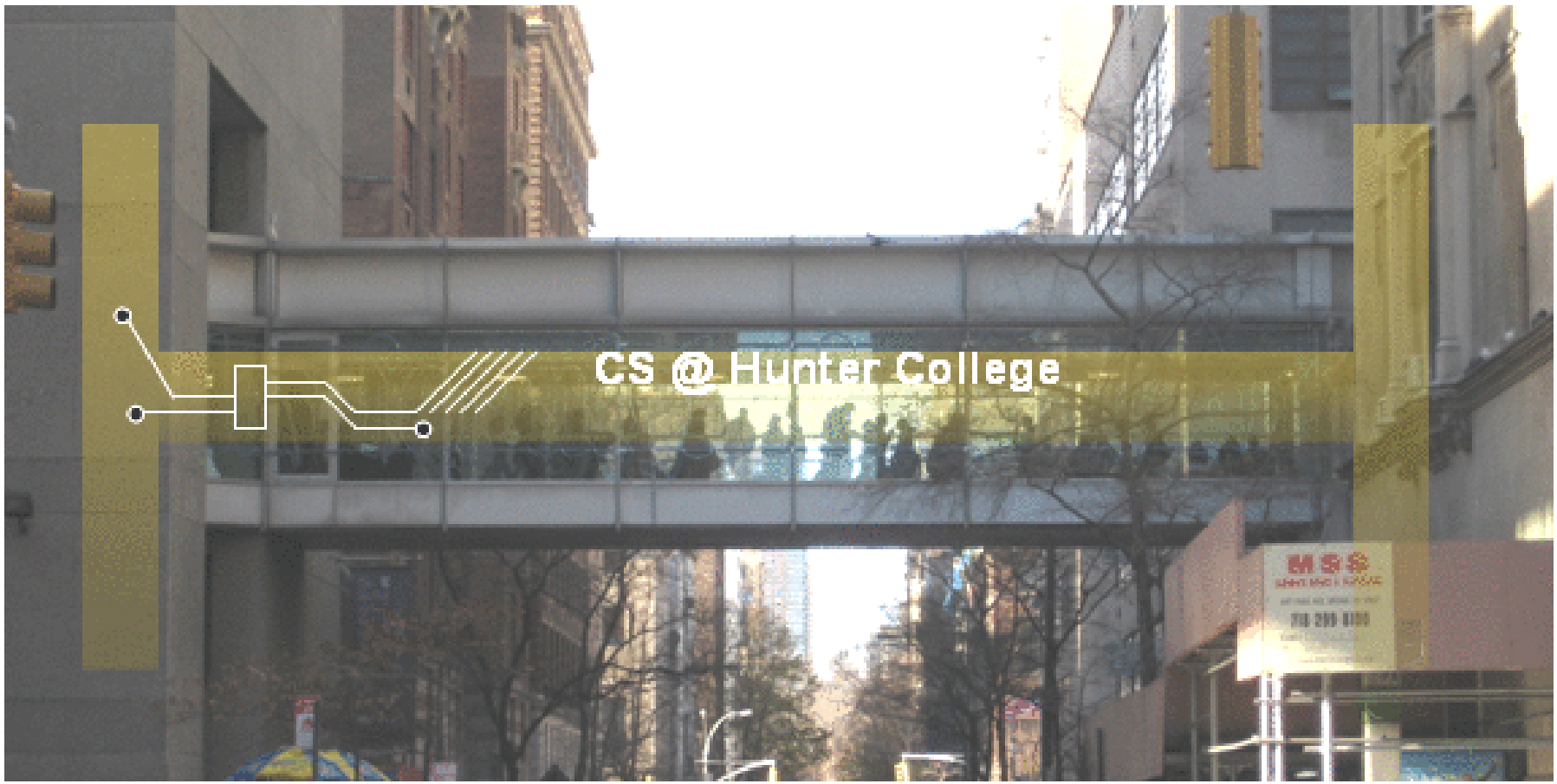
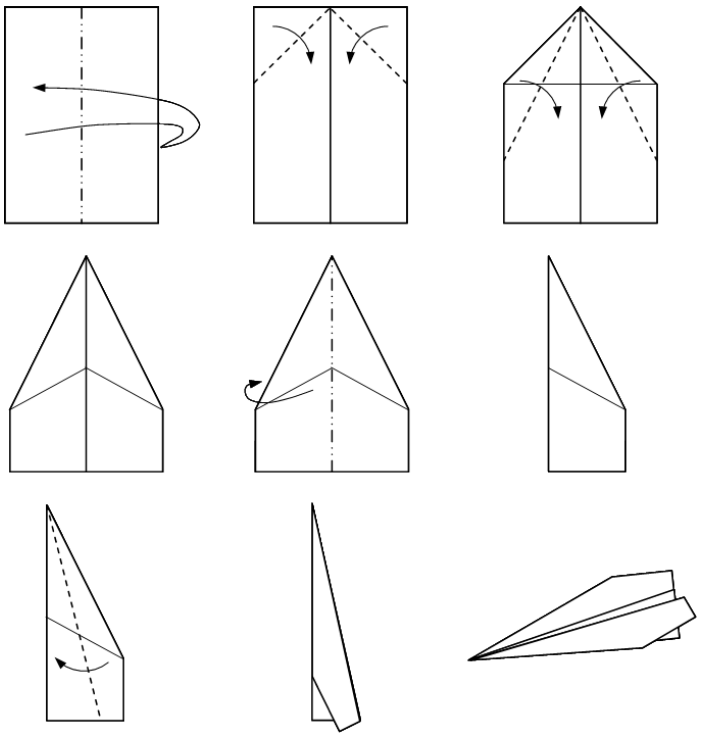
CSci 127: Introduction to Computer Science



hunter.cuny.edu/csci

Announcements



- Guest Lecturer: Katherine Howitt

Frequently Asked Questions

From lecture slips & recitation sections.

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  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

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- **Arithmetic**
- Indexing and Slicing Lists
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Arithmetic

Some arithmetic operators in Python:

- Addition:

Arithmetic

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- Addition: `sum = sum + 3`

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Arithmetic

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- Multiplication:

Arithmetic

Some arithmetic operators in Python:

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

Arithmetic

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- Multiplication: `area = h * w`
- Division:

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Some arithmetic operators in Python:

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

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- Floor or Integer Division:
  `weeks = totalDays // 7`

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- Remainder or Modulus:

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- 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.")
```

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- If the user enters, 12 and 4.

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

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```
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?

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

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In particular, what is printed...

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```

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.
```

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Enter how long: 20
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Your event ends at 4 o'clock.
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```
Enter starting time: 11
Enter how long: 1
Your event starts at 11 o'clock.
Your event ends at 0 o'clock.
```

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- **Indexing and Slicing Lists**
- Design Challenge: Planes
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In Pairs or Triples...

Mostly review:

```
 1  for d in range(10, 0, -1):
 2      print(d)
 3  print("Blast off!")
 4
 5  for num in range(5,8):
 6      print(num, 2*num)
 7
 8  s = "City University of New York"
 9  print(s[3], s[0:3], s[:3])
10  print(s[5:8], s[-1])
11
12  names = ["Eleanor", "Anna", "Alice", "Edith"]
13  for n in names:
14      print(n)
```

Python Tutor

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(Demo with pythonTutor)

Review: range()

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- `range(stop)`

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- `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:

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  `s[5:8]`

  gives: `"Uni"`

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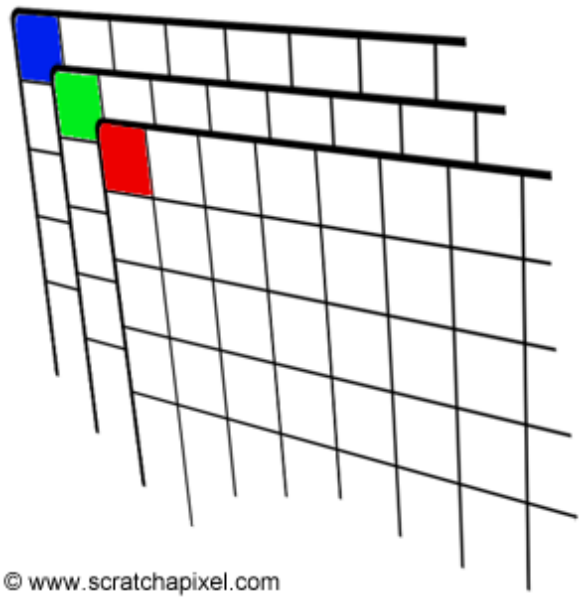
  gives: `["Anna", "Alice"]`
- Python also lets you \count backwards": last element has index: `-1`.

Preview: Images



Preview: Images

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.

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Remember to pick up all your airplanes!

Design Challenge: Initial Design (20 Minutes)

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

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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: re ning designs

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Design Challenge: Revise Design (3 Minutes)

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

With a slight twist: re ning designs

- As a team, write down your design.
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Remember to pick up all your airplanes!

Design Challenge: Build Final Planes (25 Minutes)

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

With a slight twist: re ning designs

- As a team, write down your design.
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- Will be judged on closeness to the stage.
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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: re ning 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 ies it from the balcony (must be behind rst 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 (25 Minutes)

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

With a slight twist: re ning 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 ies it from the balcony (must be behind rst row of seats).
- Will be judged on closeness to the stage.
- Winning design/build team gets chocolate.

Remember to pick up all your airplanes!

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Colors & Hexadecimal Notation

Colors

Can specify by name.

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Can specify by numbers:

- Amount of Red, Green, and Blue (RGB).

Colors

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- Adding light, not paint:

Colors

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

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

Can specify by numbers (RGB):

Colors

Can specify by numbers (RGB):

- Fractions of each:

Colors

Can specify by numbers (RGB):

- Fractions of each:
  e.g. (1.0, 0, 0) is 100% red, no green, and no blue.

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Can specify by numbers (RGB):

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- 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

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

(from i-programmer.info)

Decimal

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

(from i-programmer.info)

Decimal

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

(from i-programmer.info)

Decimal

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

(from i-programmer.info)

Decimal

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

(from i-programmer.info)

Decimal

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

(from i-programmer.info)

Decimal

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

(from i-programmer.info)

Decimal

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

(from i-programmer.info)

Decimal

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

(from i-programmer.info)

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

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

(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
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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
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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

(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
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70	71	72	73	74	75	76	77	78	79	7A	7B	7C	7D	7E	7F
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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

(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
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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

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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
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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
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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

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:
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In Pairs or Triples...

Some review and some novel challenges:

Trinkets

(Demo with trinkets)

Today's Topics

Arithmetic

Indexing and Slicing Lists

Design Challenge: Planes

Colors & Hexadecimal Notation

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Recap

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

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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 nal exam to pass the course, we end eve
lecture with nal exam review.

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Pull out something to write on (not to be turned in).

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Lightning rounds:

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Lightning rounds:

- write as much you can for 60 seconds;

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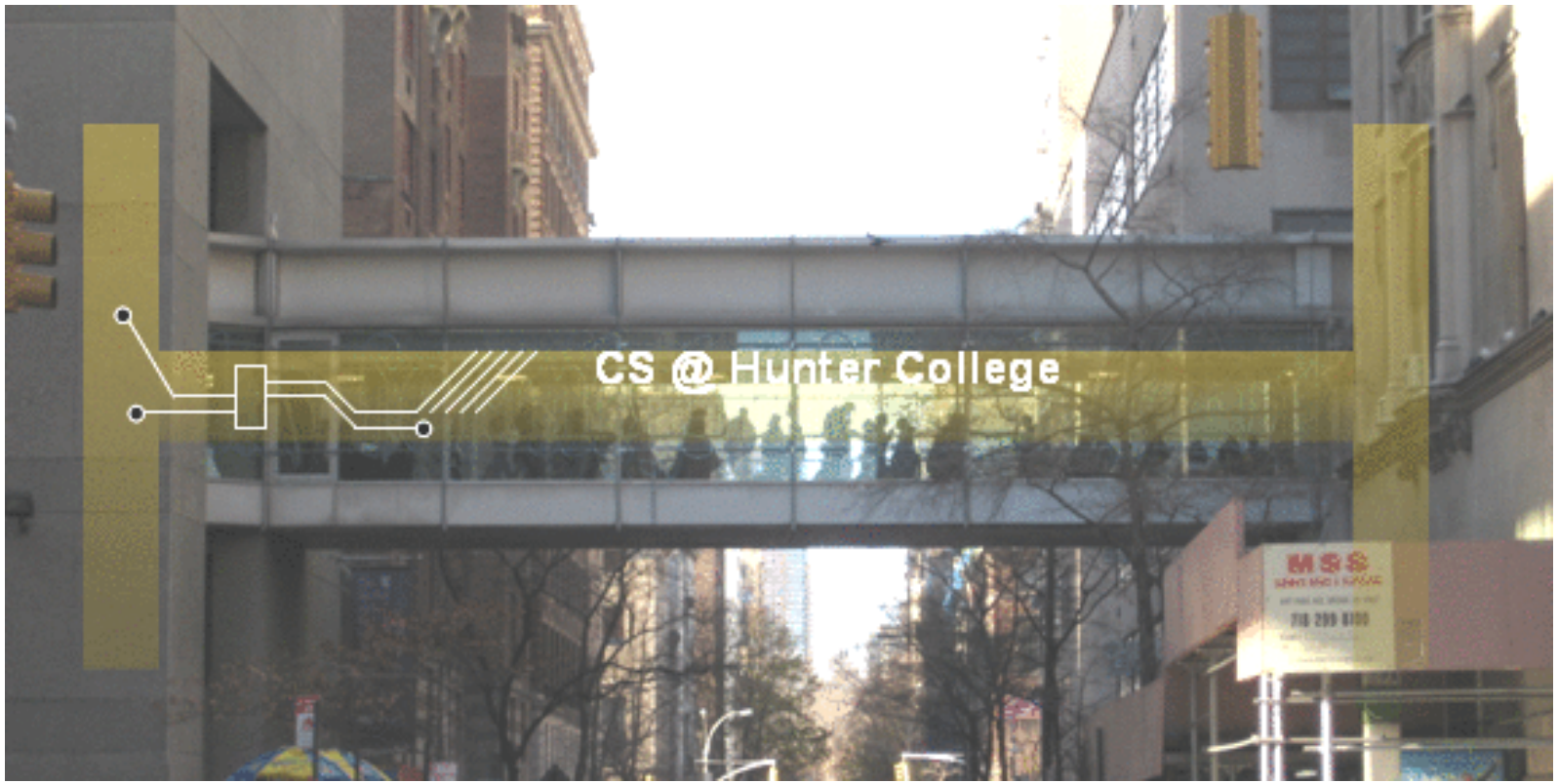
- Past exams are on the webpage (under Final Exam Information).
- We're starting with Fall 2017, Version 2.

Writing Boards



- Return writing boards as you leave...