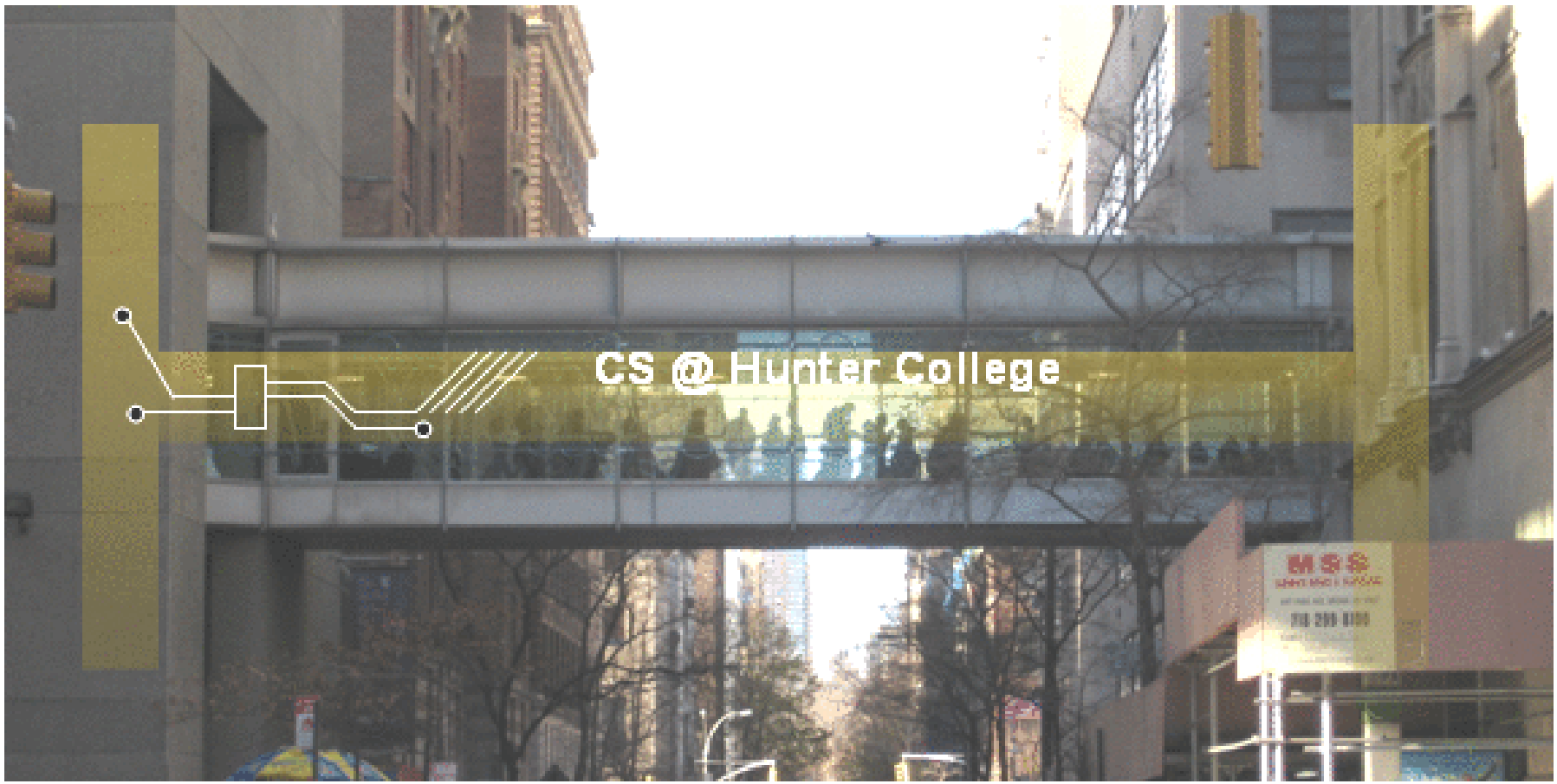
CSci 127: Introduction to Computer Science



hunter.cuny.edu/csci

Announcements

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10/1 L5	10/2 L4	10/3 L4 Lecture 5	10/4 L6	10/5 L6
Columbus Day	10/9 L5	10/10 L5 Lecture 5	10/11 L7	10/12 L7
10/15 L6	10/16 L6	10/17 L6 Lecture 6	10/18 L8	10/19 L8
10/22 L7	10/23 L7	10/24 L7 Lecture 7	10/25 L9	10/27 L9
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- Today: Prof. William Sakas, Chair of Computer Science: Computational Linguistics.

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  We'll start with some today since we didn't get to them last lecture.

Today's Topics

- Arithmetic
- Indexing and Slicing Lists
- Colors
- Hexadecimal Notation
- 2D Arrays & Image Files

Practice Quiz & Final Questions



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- We're starting with Spring 2018, Mock Exam.

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Some arithmetic operators in Python:

- Addition:

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  `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:

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- Subtraction: `deb = deb - item`
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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...

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

```
1  for d in range(10, 0, -1):
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(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)`

range()

What if you wanted to count by twos, or some other number:

```
1  #Predict what will be printed:
2
3  for num in [2,4,6,8,10]:
4      print(num)
5
6  sum = 0
7  for x in range(0,12,2):
8      print(x)
9      sum = sum + x
10
11 print(x)
12
13 for c in "ABCD":
14     print(c)
```

range()

What if you wanted to count by twos, or some other number:

- `range(start, stop, step)`

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What if you wanted to count by twos, or some other number:

- `range(start, stop, step)`
- Produces a list: [start,start+step,start+2*step...,last] (where last is the largest start+k*step less than stop)

range()

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What if you wanted to count by twos, or some other number:

- `range(start, stop, step)`
- Produces a list: [start,start+step,start+2*step...,last] (where last is the largest start+k*step less than stop)
- For example, if you want the the list [5,10,...,50] you would write:

range()

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1  #Predict what will be printed:
2
3  for num in [2,4,6,8,10]:
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7  for x in range(0,12,2):
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13 for c in "ABCD":
14     print(c)
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What if you wanted to count by twos, or some other number:

- `range(start, stop, step)`
- Produces a list:
  [start,start+step,start+2*step...,last]
  (where last is the largest start+k*step less than stop)
- For example, if you want the the list [5,10,...,50]
  you would write:

  `range(5,51,5)`

Slices

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

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

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```

- 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`.

Colors

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

- Can specify by name.

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

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  - Adding light, not paint:

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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	
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- 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	
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- Can specify by numbers (RGB):

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

Colors

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

Colors

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- Can specify by numbers (RGB):
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  - 8-bit colors: numbers from 0 to 255:

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    e.g. `(0, 255, 0)` is no red, 100% green, and no blue.

Colors

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Black	#000000	
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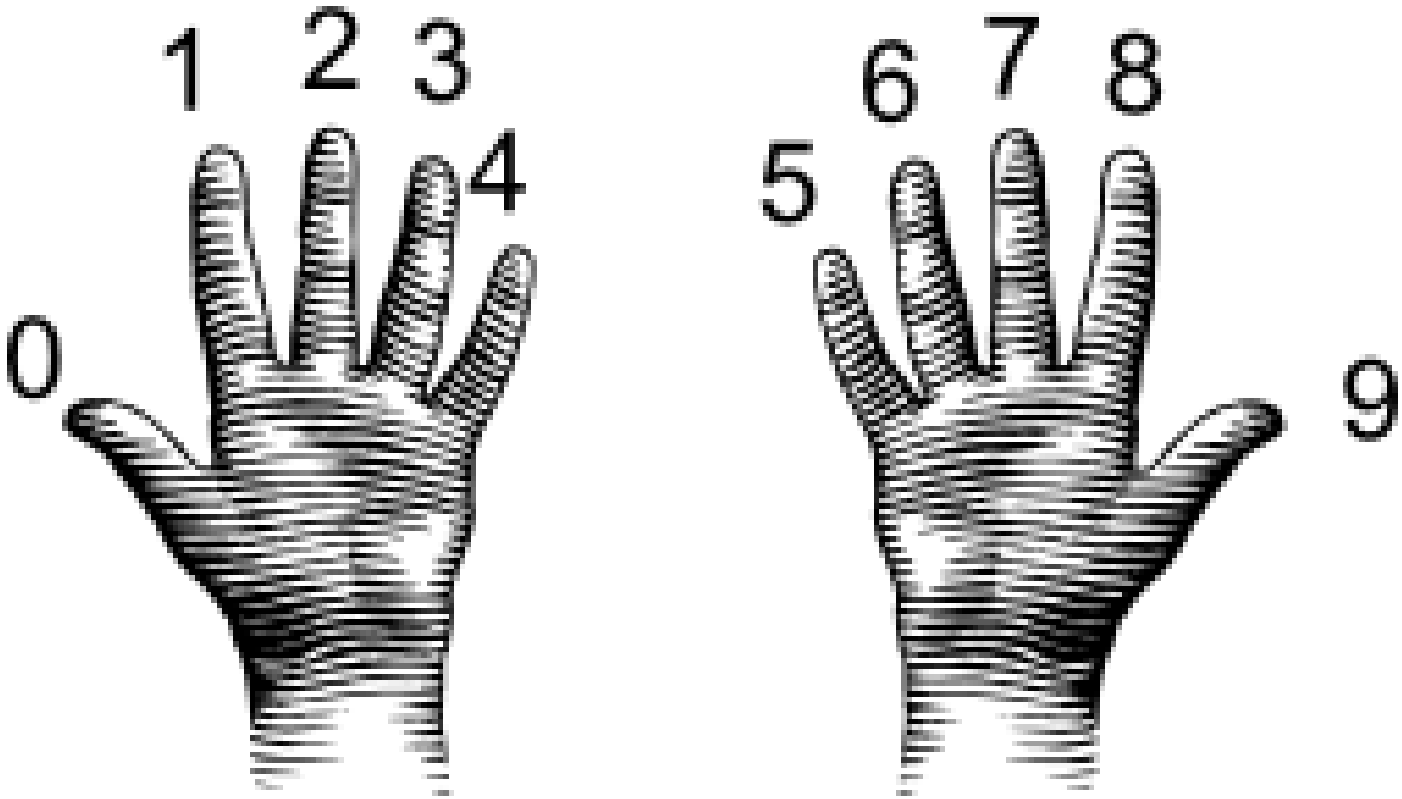
- Can specify by numbers (RGB):
  - Fractions of each:
    e.g. `(1.0, 0, 0)` is 100% red, no green, and no blue.
  - 8-bit colors: numbers from 0 to 255:
    e.g. `(0, 255, 0)` is no red, 100% green, and no blue.
  - Hexcodes (base-16 numbers)...

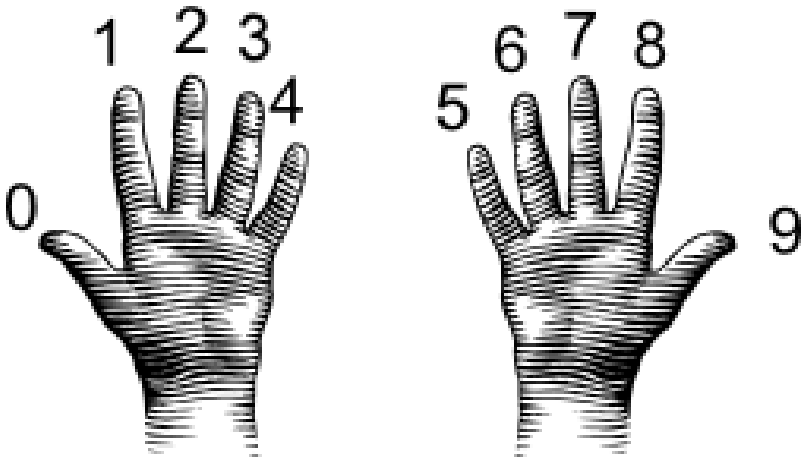
Decimal & Hexadecimal Numbers

Counting with 10 digits:



(from i-programmer.info)

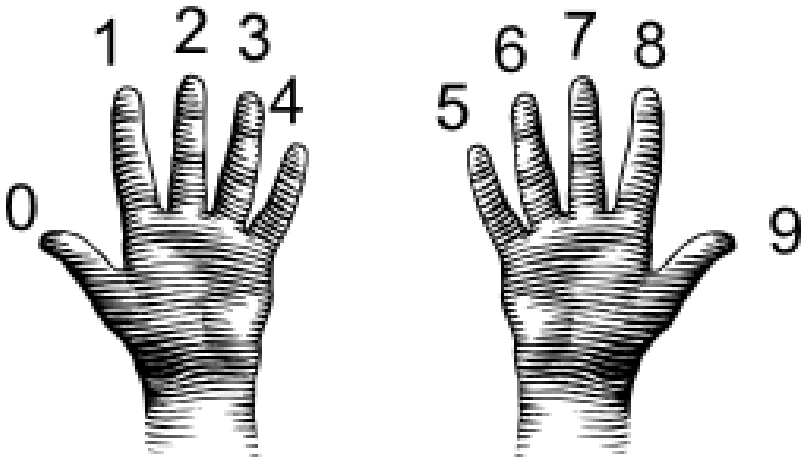
Decimal



(from i-programmer.info)

Decimal

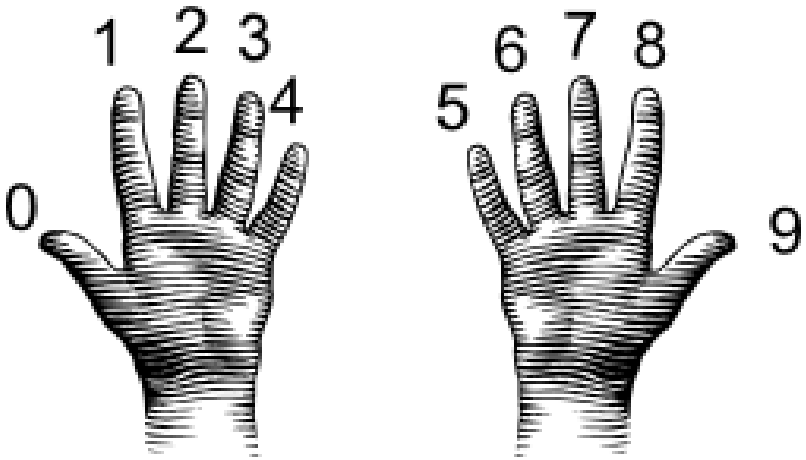
00 01 02 03 04 05 06 07 08 09



(from i-programmer.info)

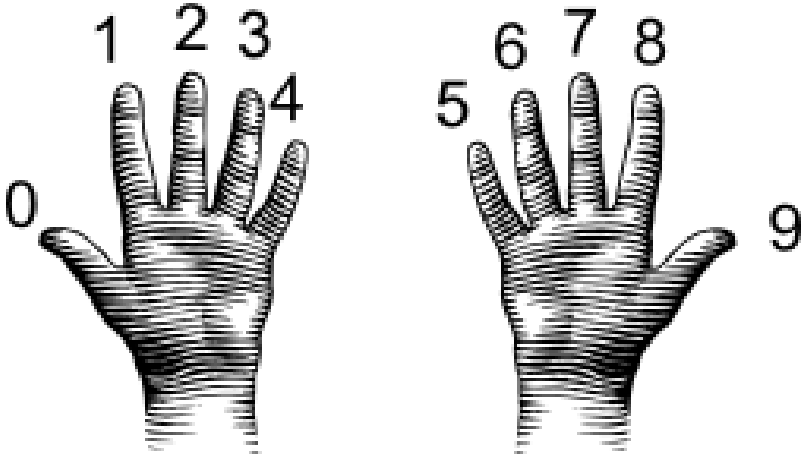
Decimal

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



(from i-programmer.info)

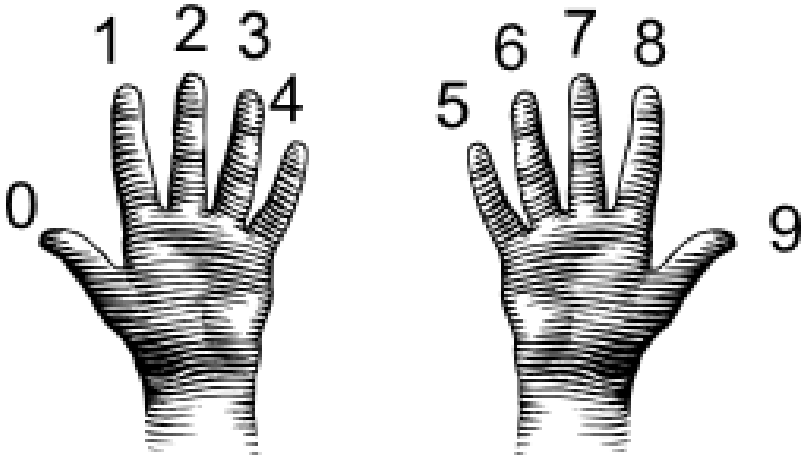
Decimal



(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

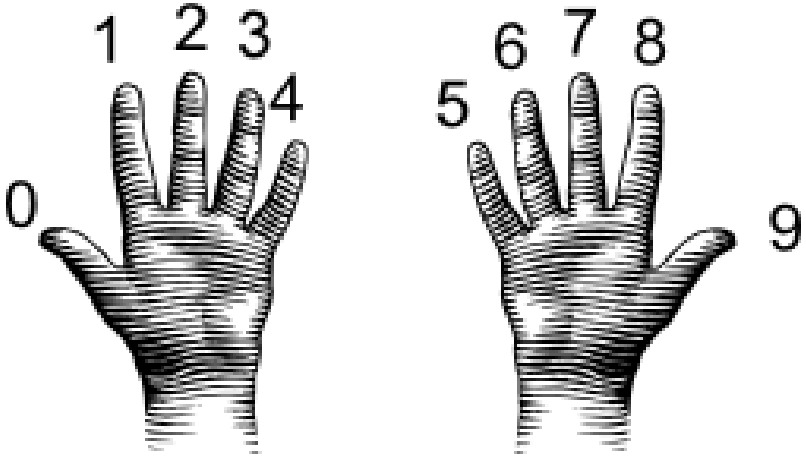
Decimal



(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



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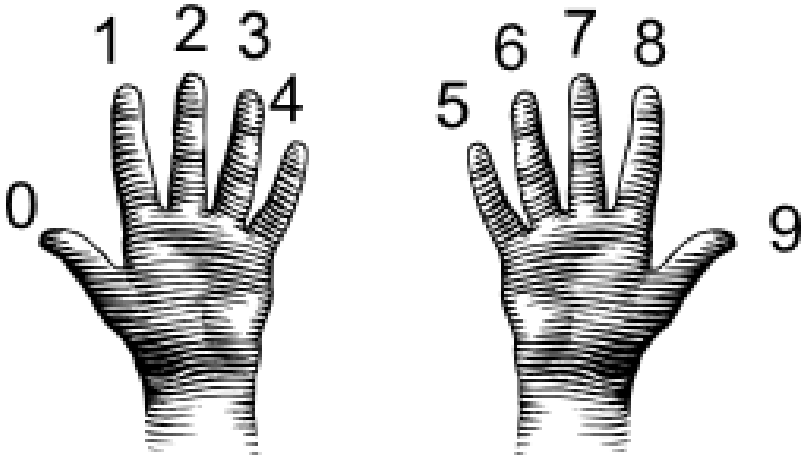
00 01 02 03 04 05 06 07 08 09
10 11 12 13 14 15 16 17 18 19
20 21 22 23 24 25 26 27 28 29
30 31 32 33 34 35 36 37 38 39
40 41 42 43 44 45 46 47 48 49

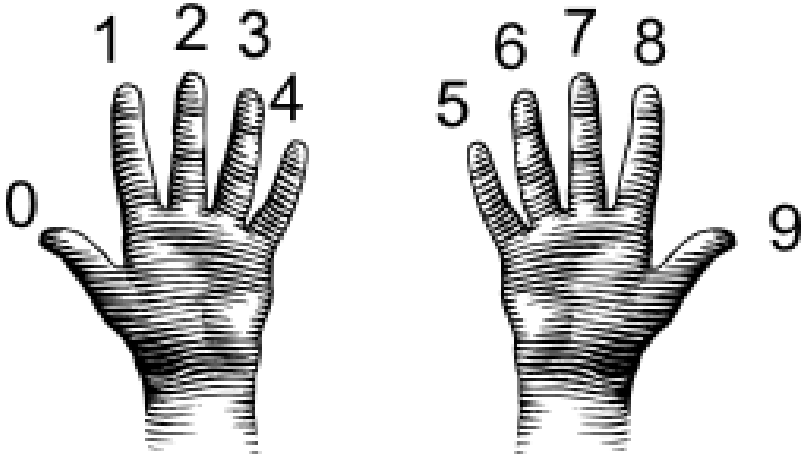
Decimal



(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

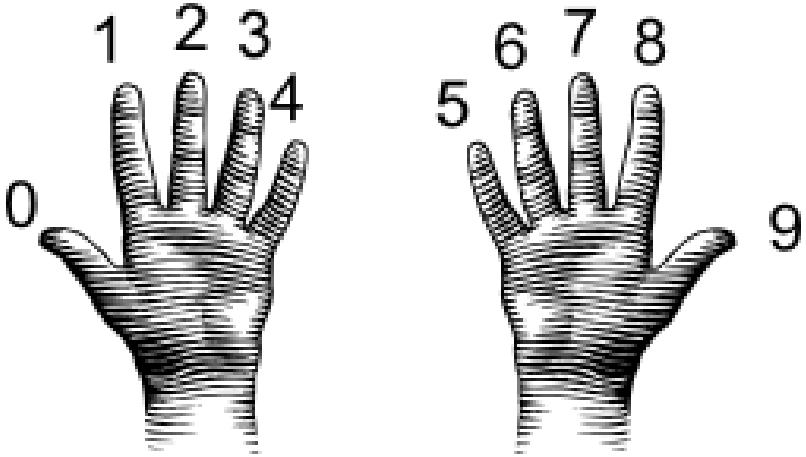
Decimal



(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



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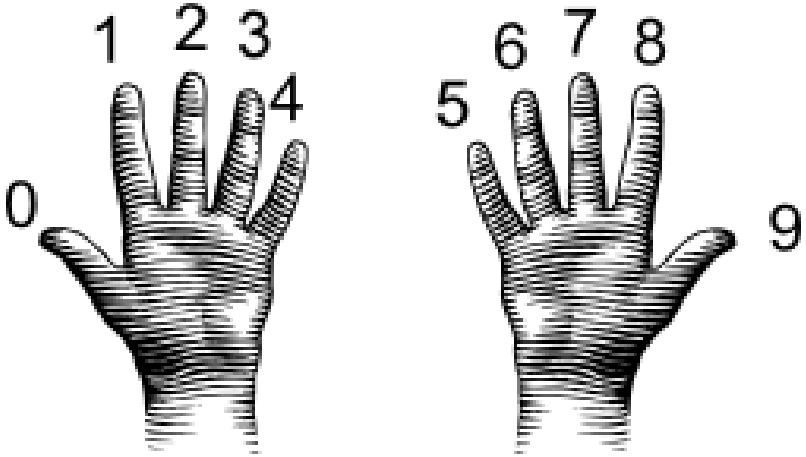
30	31	32	33	34	35	36	37	38	39
40	41	42	43	44	45	46	47	48	49
50	51	52	53	54	55	56	57	58	59
60	61	62	63	64	65	66	67	68	69
70	71	72	73	74	75	76	77	78	79

Decimal



(from i-programmer.info)

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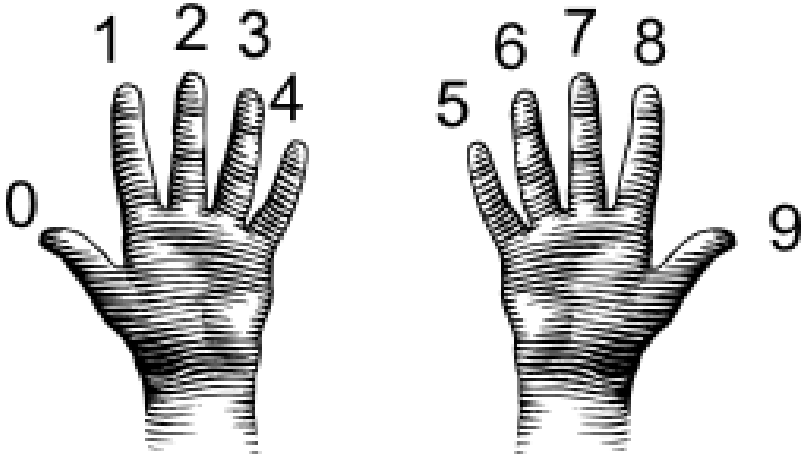
10	11	12	13	14	15	16	17	18	19
20	21	22	23	24	25	26	27	28	29
30	31	32	33	34	35	36	37	38	39
40	41	42	43	44	45	46	47	48	49
50	51	52	53	54	55	56	57	58	59
60	61	62	63	64	65	66	67	68	69
70	71	72	73	74	75	76	77	78	79
80	81	82	83	84	85	86	87	88	89

Decimal



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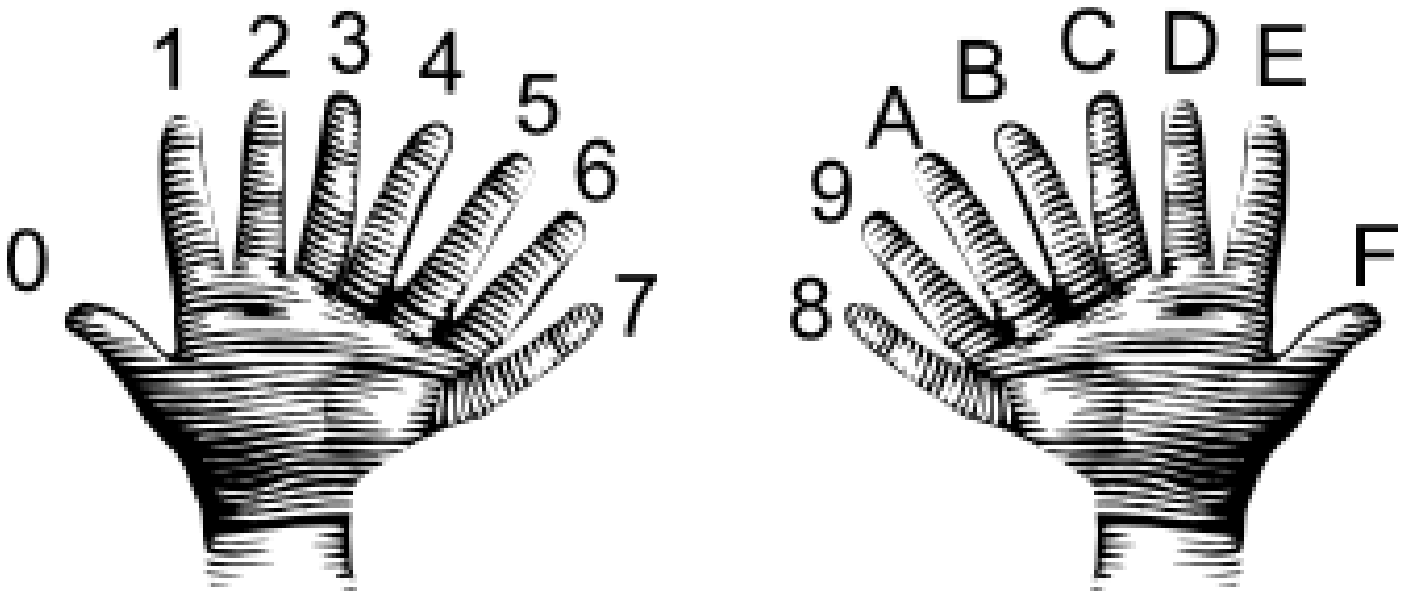
40	41	42	43	44	45	46	47	48	49
50	51	52	53	54	55	56	57	58	59
60	61	62	63	64	65	66	67	68	69
70	71	72	73	74	75	76	77	78	79
80	81	82	83	84	85	86	87	88	89
90	91	92	93	94	95	96	97	98	99

Decimal & Hexadecimal Numbers

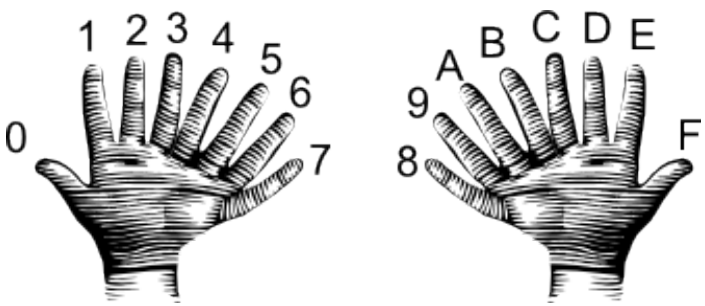
Counting with 16 digits:



(from i-programmer.info)

Hexadecimal

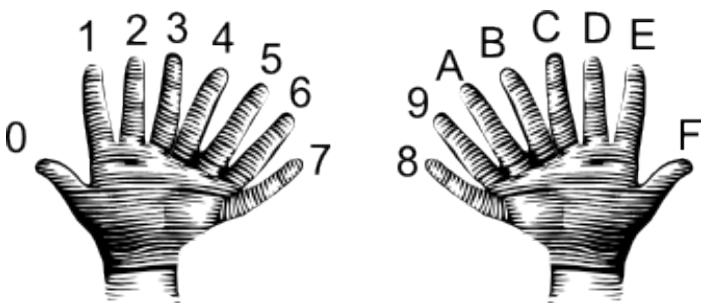
```
00 01 02 03 04 05 06 07 08 09 0A 0B 0C 0D 0E 0F
```



(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

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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
20 21 22 23 24 25 26 27 28 29 2A 2B 2C 2D 2E 2F
```

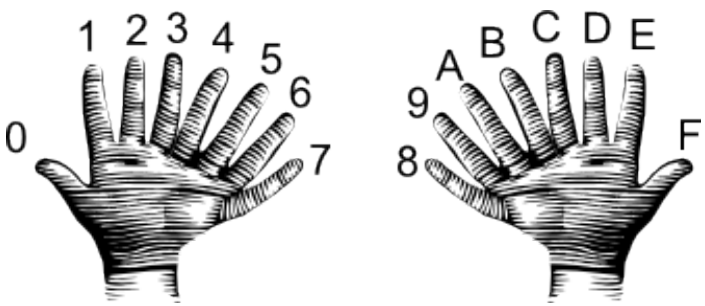

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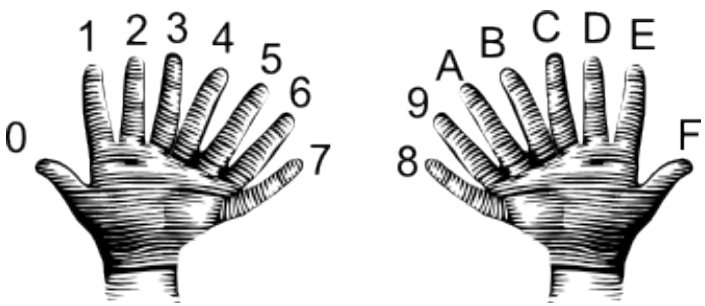
Hexadecimal



(from i-programmer.info)

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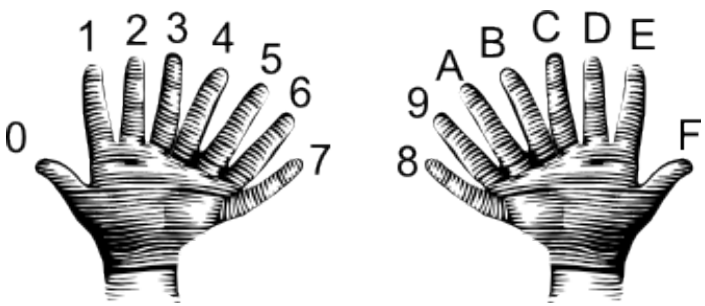
10 11 12 13 14 15 16 17 18 19 1A 1B 1C 1D 1E 1F
20 21 22 23 24 25 26 27 28 29 2A 2B 2C 2D 2E 2F
30 31 32 33 34 35 36 37 38 39 3A 3B 3C 3D 3E 3F
```

Hexadecimal



(from i-programmer.info)

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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
```
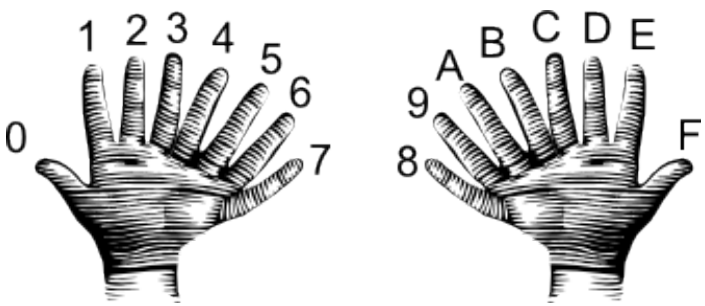

Hexadecimal



(from i-programmer.info)

```
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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
```
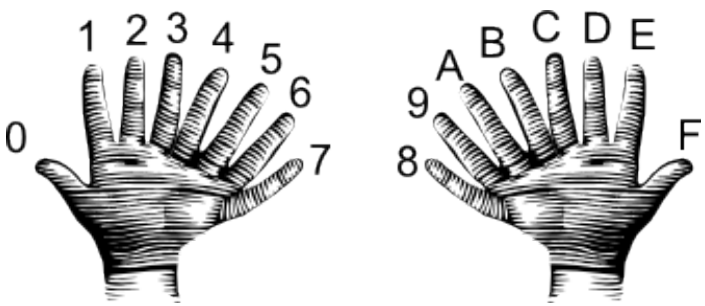
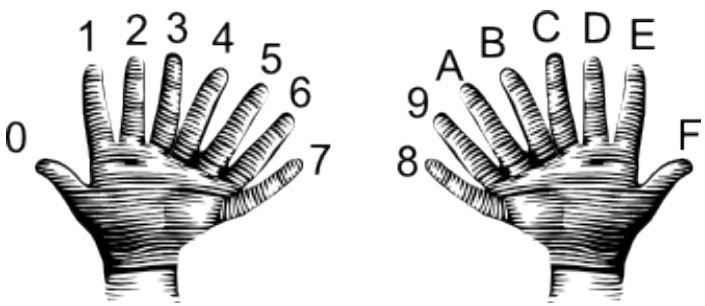

Hexadecimal



(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)

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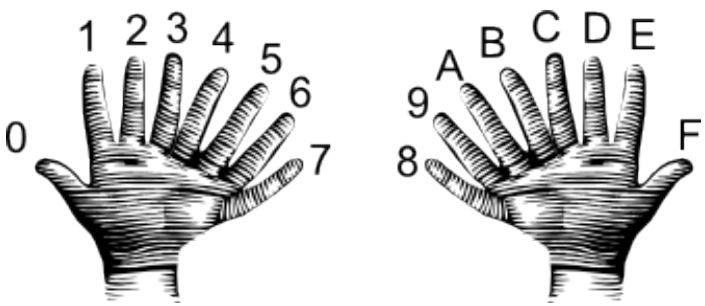

Hexadecimal



(from i-programmer.info)

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00 01 02 03 04 05 06 07 08 09 0A 0B 0C 0D 0E 0F
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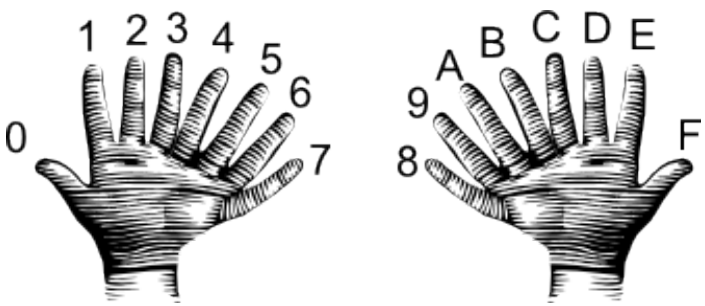
80 81 82 83 84 85 86 87 88 89 8A 8B 8C 8D 8E 8F
```

Hexadecimal



(from i-programmer.info)

```
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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
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70 71 72 73 74 75 76 77 78 79 7A 7B 7C 7D 7E 7F
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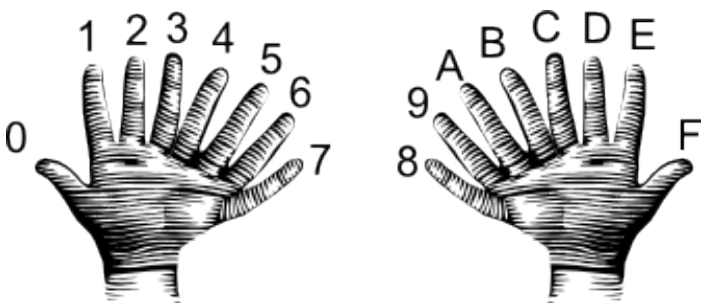
90 91 92 93 94 95 96 97 98 99 9A 9B 9C 9D 9E 9F
```

Hexadecimal



(from i-programmer.info)

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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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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
```
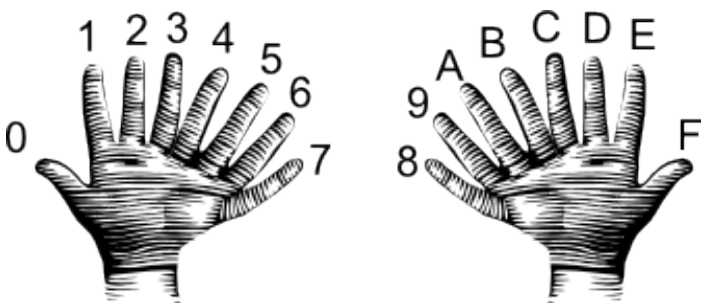

Hexadecimal



(from i-programmer.info)

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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
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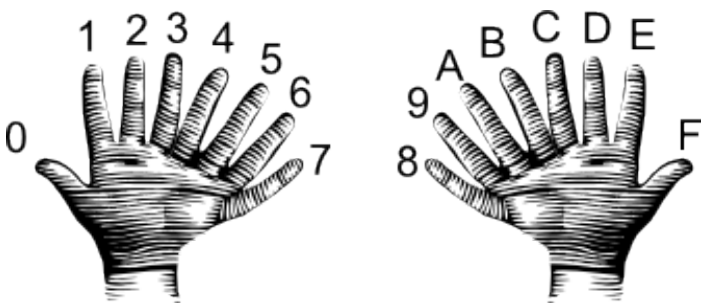
60 61 62 63 64 65 66 67 68 69 6A 6B 6C 6D 6E 6F
70 71 72 73 74 75 76 77 78 79 7A 7B 7C 7D 7E 7F
80 81 82 83 84 85 86 87 88 89 8A 8B 8C 8D 8E 8F
90 91 92 93 94 95 96 97 98 99 9A 9B 9C 9D 9E 9F
A0 A1 A2 A3 A4 A5 A6 A7 A8 A9 AA AB AC AD AE AF
B0 B1 B2 B3 B4 B5 B6 B7 B8 B9 BA BB BC BD BE BF
```

Hexadecimal



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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
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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
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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
```
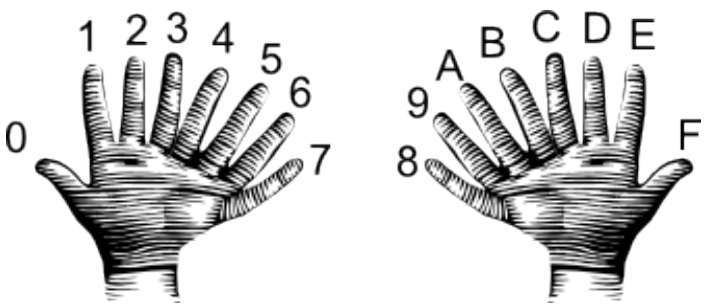

Hexadecimal



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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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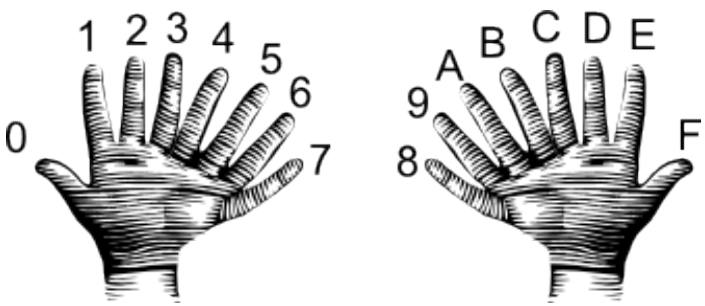
70 71 72 73 74 75 76 77 78 79 7A 7B 7C 7D 7E 7F
80 81 82 83 84 85 86 87 88 89 8A 8B 8C 8D 8E 8F
90 91 92 93 94 95 96 97 98 99 9A 9B 9C 9D 9E 9F
A0 A1 A2 A3 A4 A5 A6 A7 A8 A9 AA AB AC AD AE AF
B0 B1 B2 B3 B4 B5 B6 B7 B8 B9 BA BB BC BD BE BF
C0 C1 C2 C3 C4 C5 C6 C7 C8 C9 CA CB CC CD CE CF
D0 D1 D2 D3 D4 D5 D6 D7 D8 D9 DA DB DC DD DE DF
```

Hexadecimal



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00 01 02 03 04 05 06 07 08 09 0A 0B 0C 0D 0E 0F
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80 81 82 83 84 85 86 87 88 89 8A 8B 8C 8D 8E 8F
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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
```
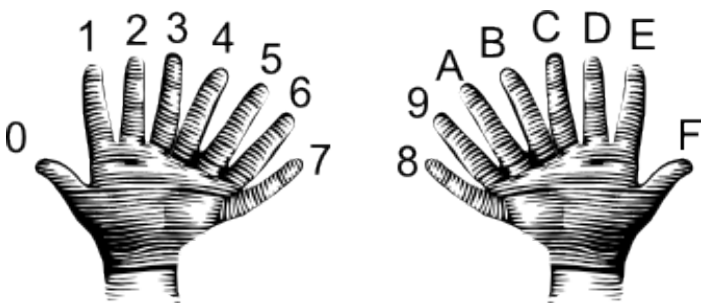

Hexadecimal



(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
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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
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):

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  - 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:

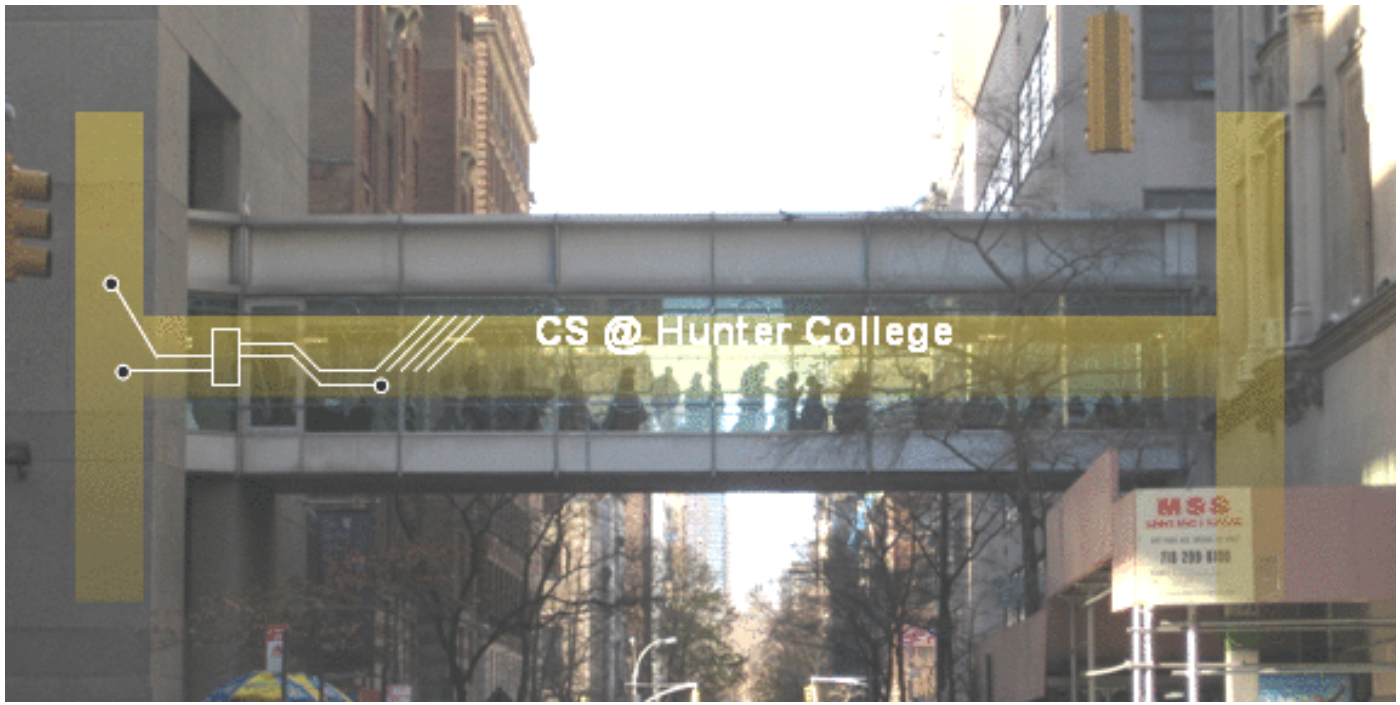
```
1  import turtle
2  teddy = turtle.Turtle()
3
4  names = ["violet", "purple", "indigo", "lavender"]
5  for c in names:
6    teddy.color(c)
7    teddy.left(60)
8    teddy.forward(40)
9    teddy.dot(10)
10
11 teddy.penup()
12 teddy.forward(100)
13 teddy.pendown()
14
15 hexNames = ["#FF00FF", "#990099", "#550055", "#111111"]
16 for c in hexNames:
17   teddy.color(c)
18   teddy.left(60)
19   teddy.forward(40)
20   teddy.dot(10)
```

Trinkets

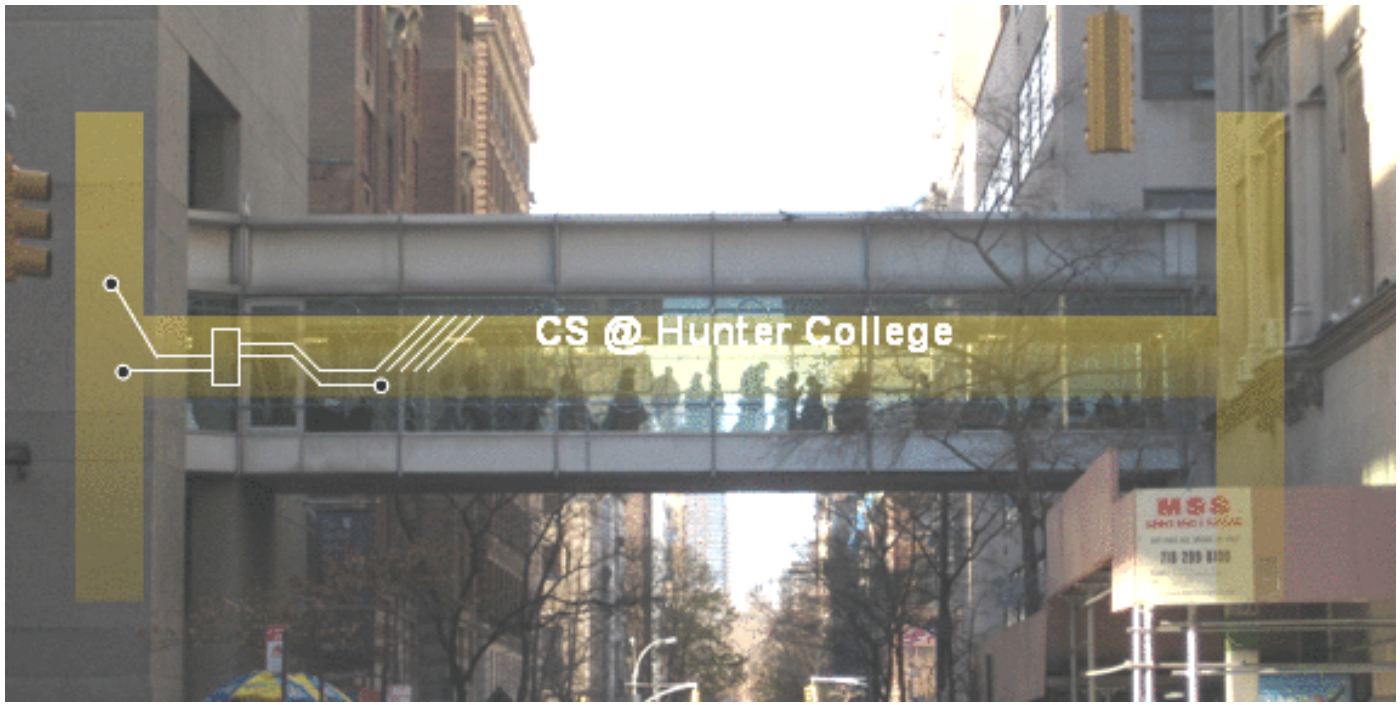
```
1  import turtle
2  teddy = turtle.Turtle()
3
4  names = ["violet", "purple", "indigo", "lavender"]
5  for c in names:
6    teddy.color(c)
7    teddy.left(60)
8    teddy.forward(40)
9    teddy.dot(10)
10
11 teddy.penup()
12 teddy.forward(100)
13 teddy.pendown()
14
15 hexNames = ["#FF00FF", "#990099", "#550055", "#111111"]
16 for c in hexNames:
17   teddy.color(c)
18   teddy.left(60)
19   teddy.forward(40)
20   teddy.dot(10)
```

(Demo with `trinkets`)

Images

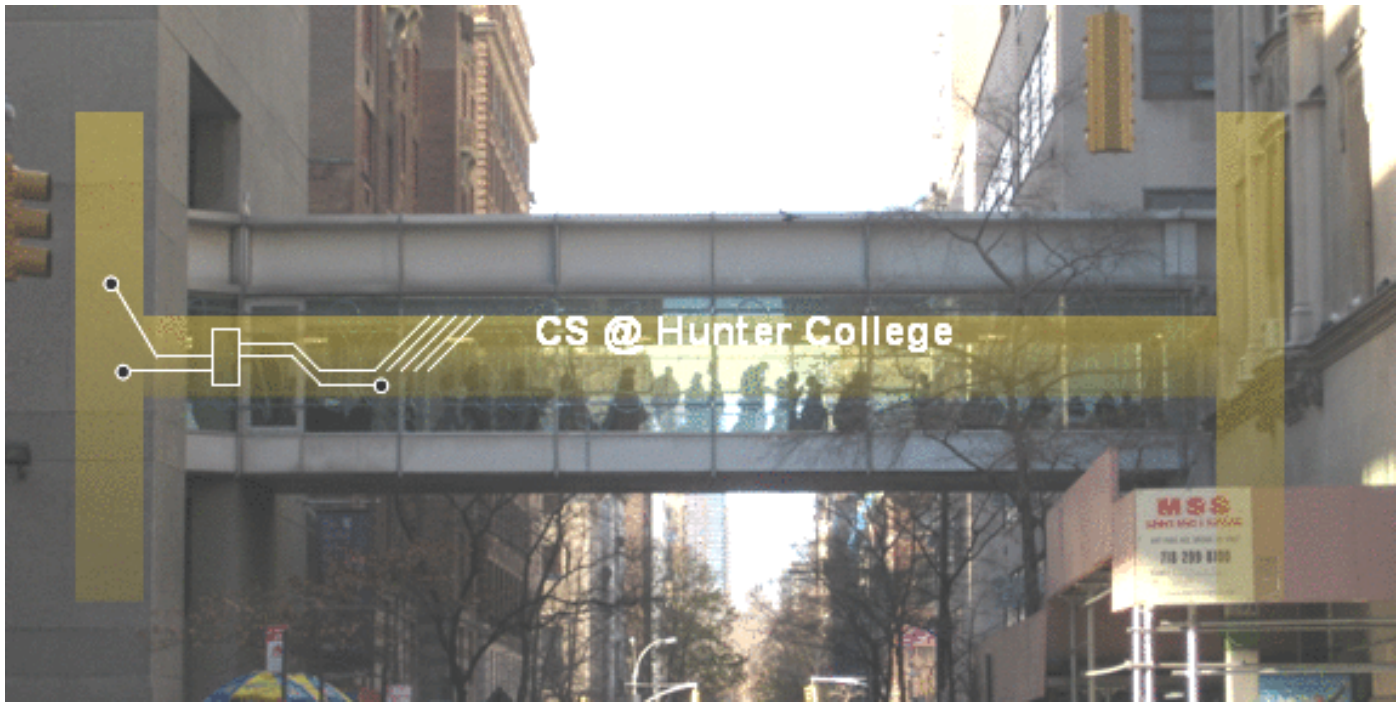


Images



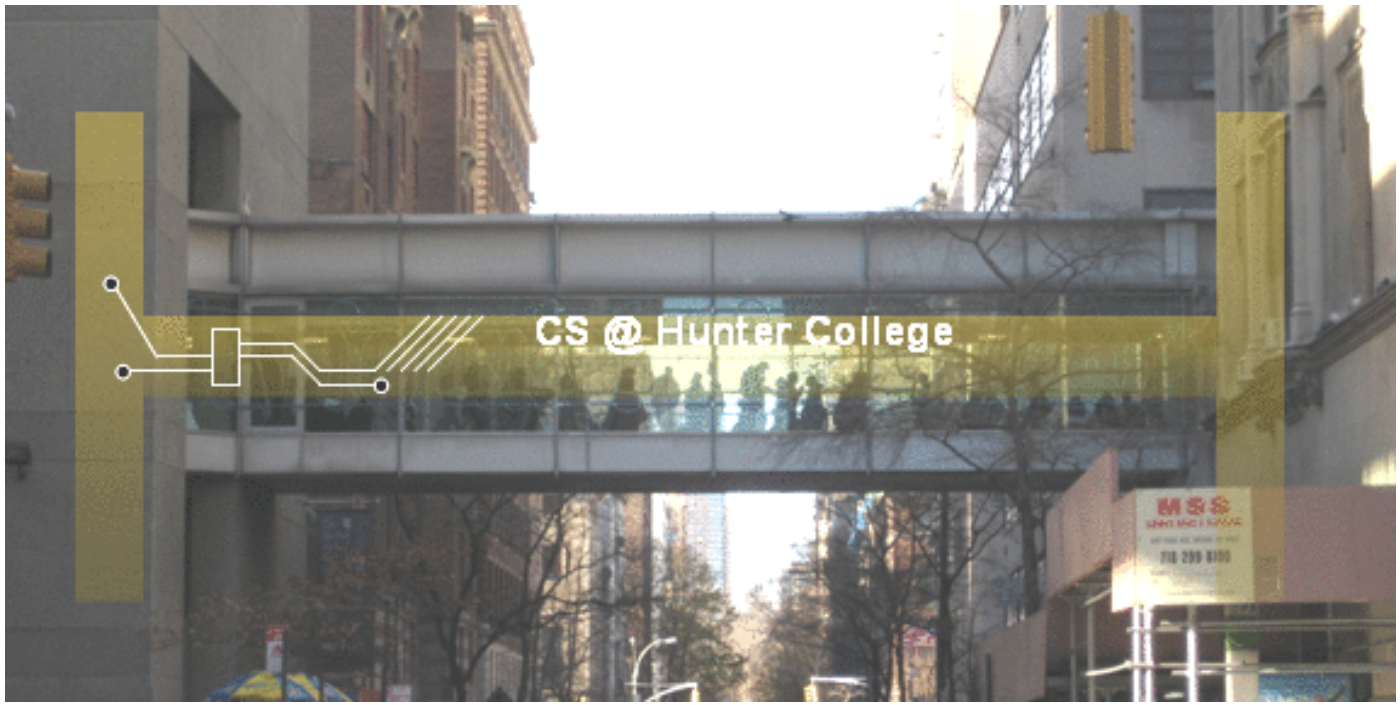
- We will use the standard portable network graphics (PNG) file format.

Images



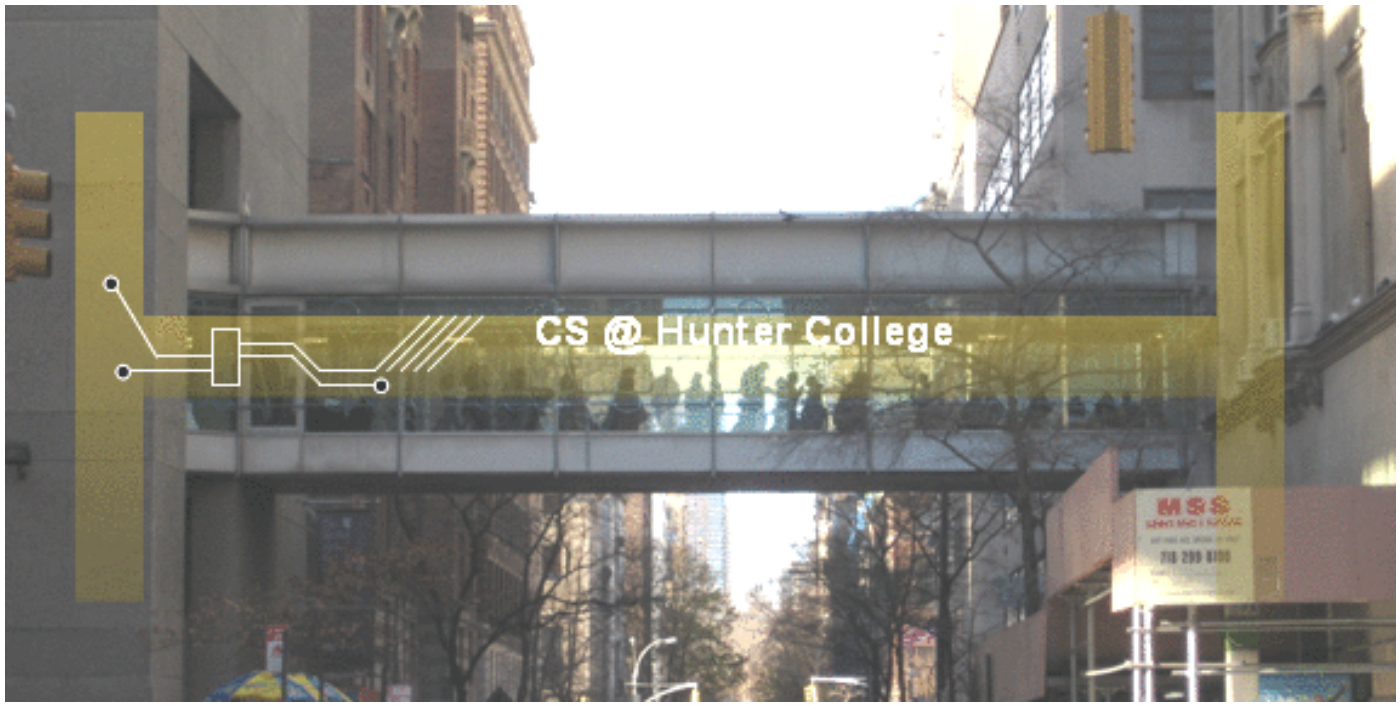
- We will use the standard portable network graphics (PNG) file format.
- Saves every picture element (or 'pixel')–

Images



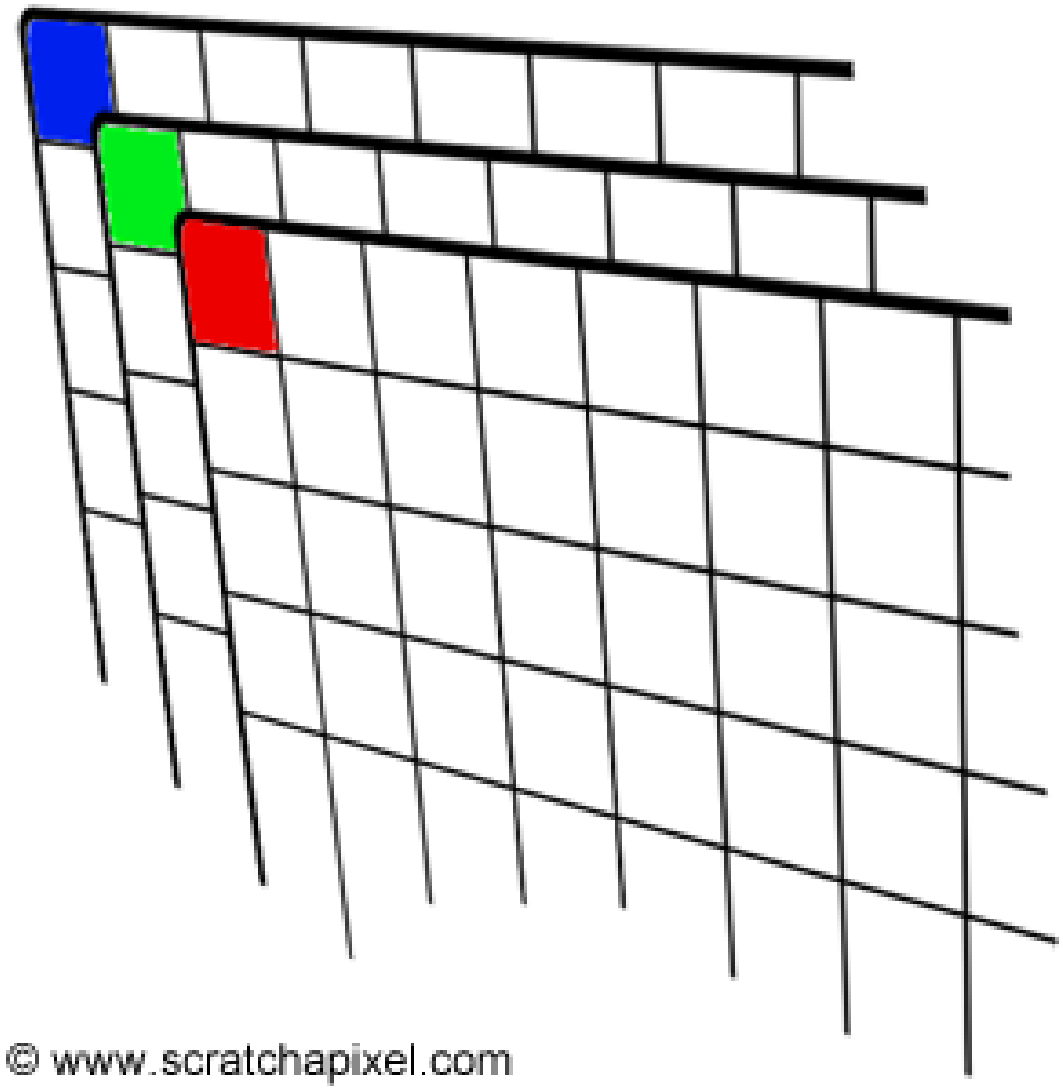
- We will use the standard portable network graphics (PNG) file format.
- Saves every picture element (or 'pixel')– often called a lossless format.

Images

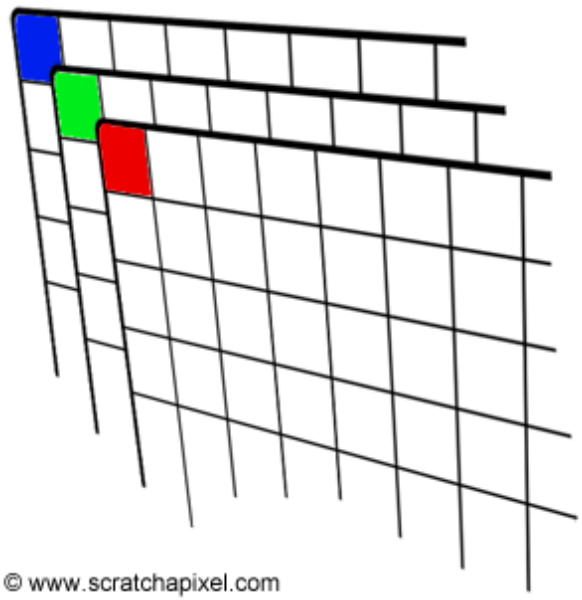


- We will use the standard portable network graphics (PNG) file format.
- Saves every picture element (or 'pixel')– often called a lossless format.
- Keeps track of the amount of red, blue, and green of each pixel.

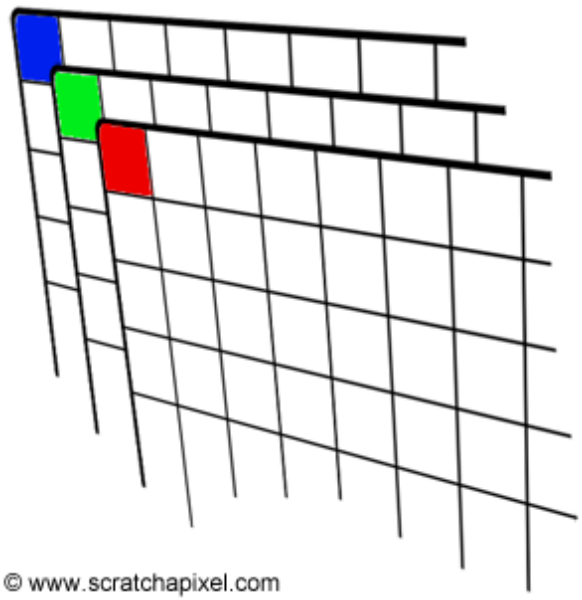
Images



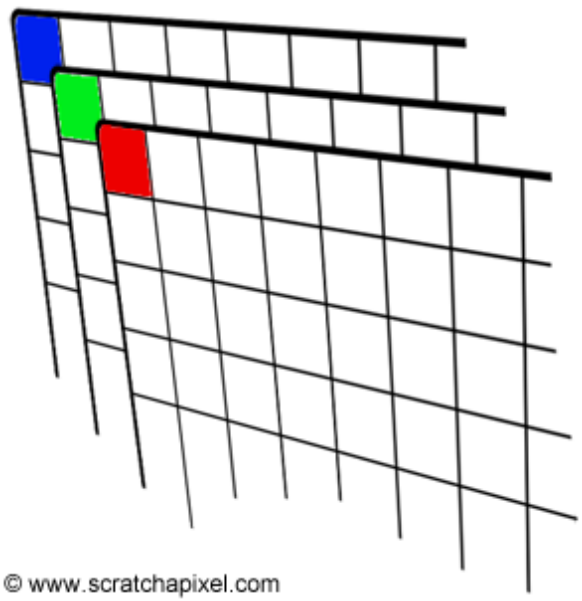
Images

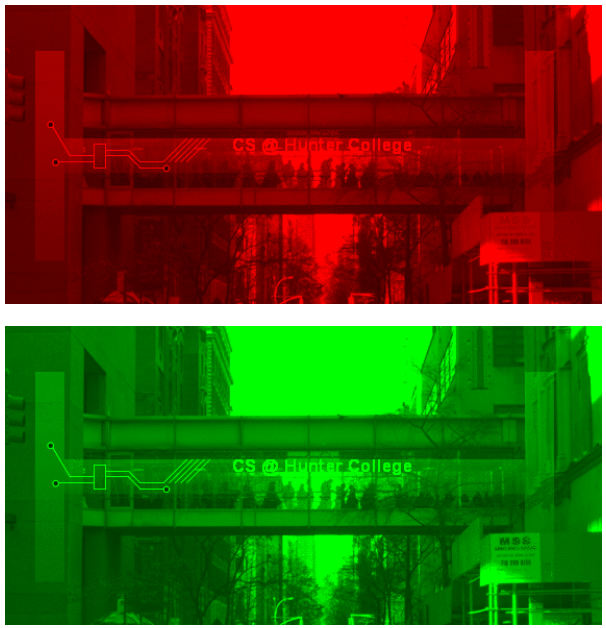


Images

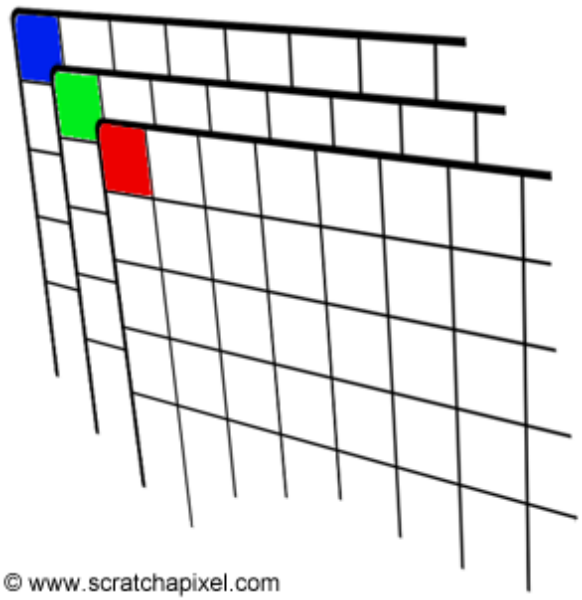


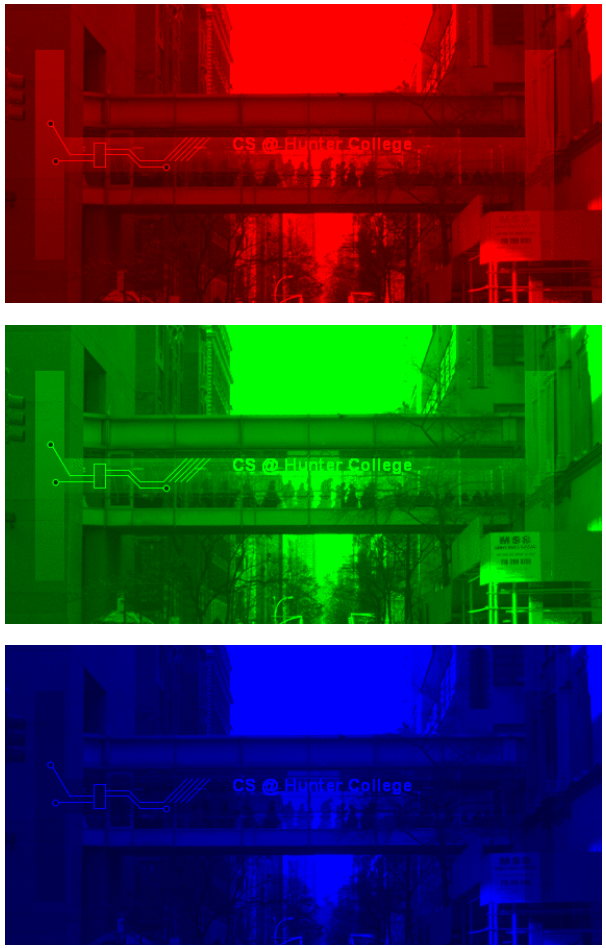
Images





Images


© www.scratchapixel.com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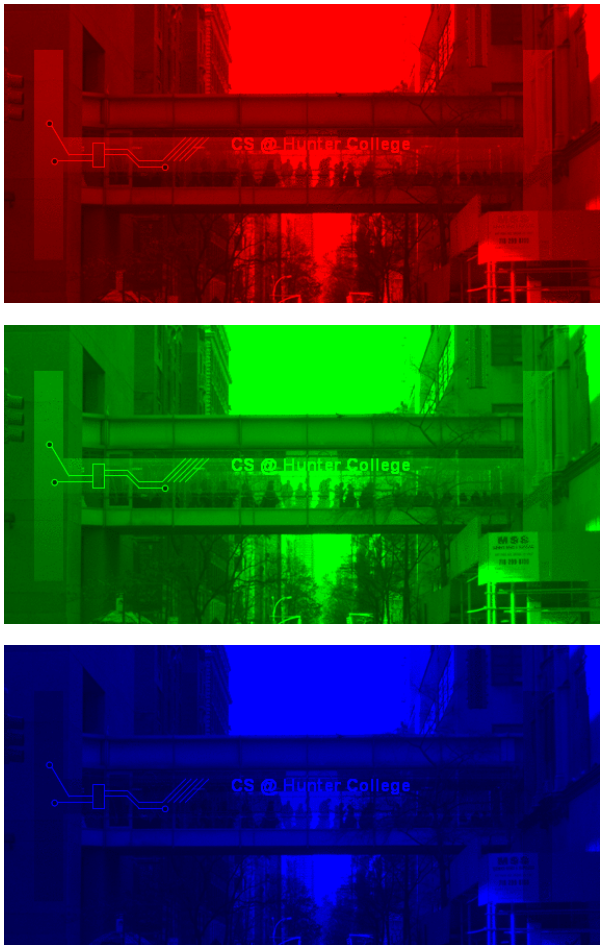
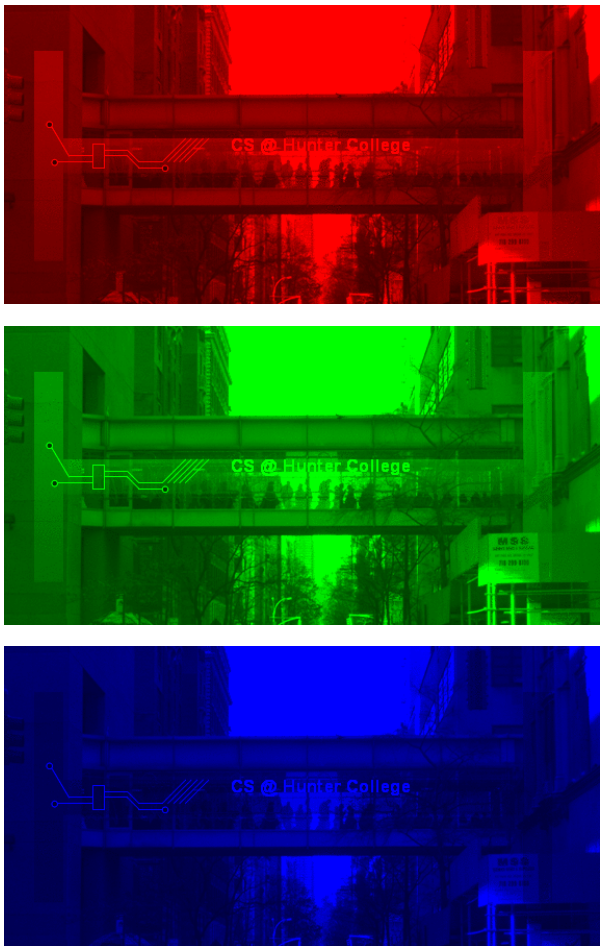
CS @ Hunter College

Useful Packages



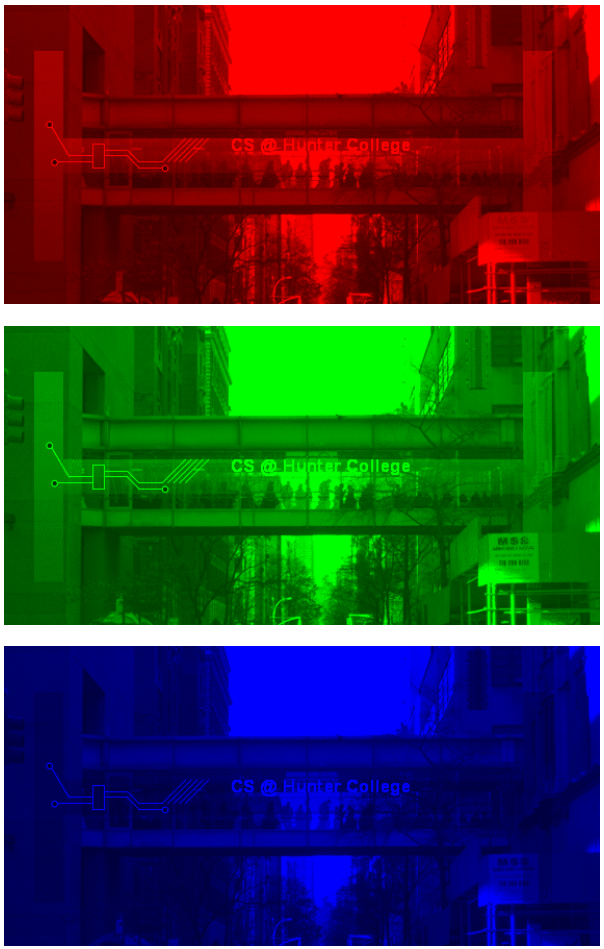
- We will use 2 useful packages for images:

Useful Packages



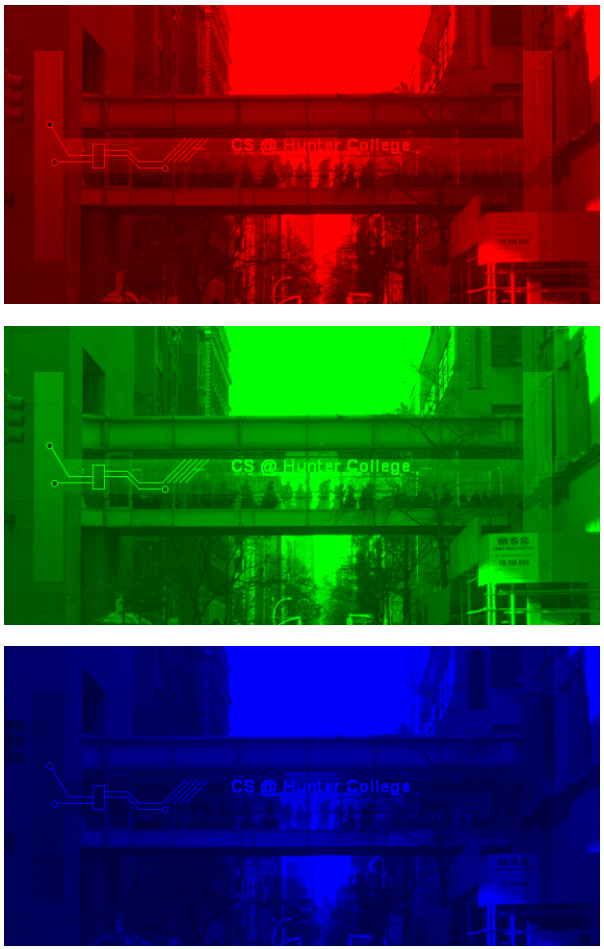
- We will use 2 useful packages for images:
  - `numpy`: numerical analysis package

Useful Packages



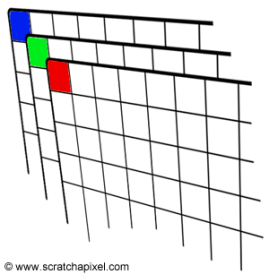
- We will use 2 useful packages for images:
  - `numpy`: numerical analysis package
  - `pyplot`: part of `matplotlib` for making graphs and plots

Useful Packages



- We will use 2 useful packages for images:
  - `numpy`: numerical analysis package
  - `pyplot`: part of `matplotlib` for making graphs and plots
- See lab notes for installing on your home machine.

Images with pyplot and numpy




```
#Import the packages for images and arrays:
import matplotlib.pyplot as plt
import numpy as np


img = plt.imread('csBridge.png')    #Read in image from csBridge.png
plt.imshow(img)                      #Load image into pyplot
plt.show()                           #Show the image (waits until close

img2 = img.copy()          #make a copy of our image
img2[:,:,1] = 0            #Set the green channel to 0
img2[:,:,2] = 0            #Set the blue channel to 0

plt.imshow(img2)           #Load our new image into pyplot
plt.show()                 #Show the image (waits until closed to conti

plt.imsave('reds.png', img2)  #Save the image we created to the file:
```

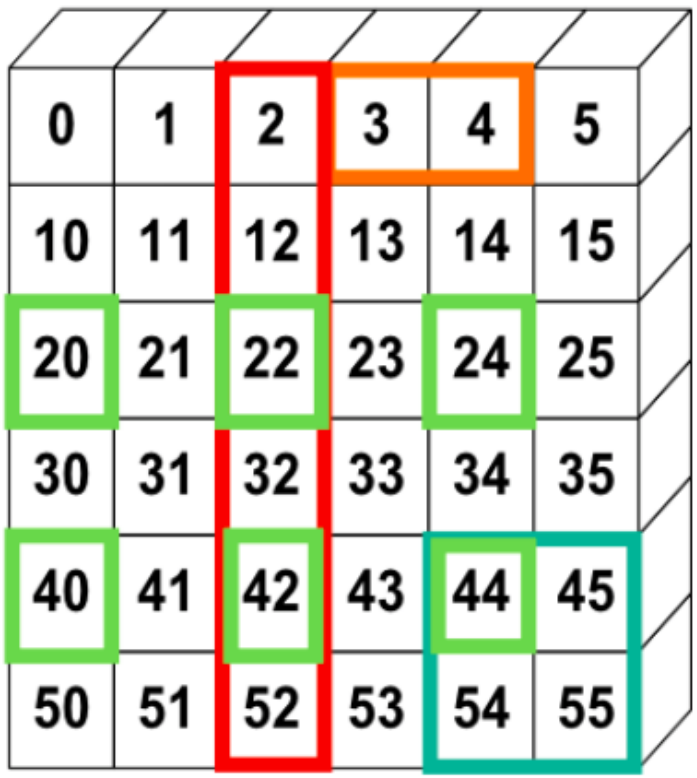
More on numpy arrays

```
>>> a[0,3:5]
array([3,4])

>>> a[4:,4:]
array([[44, 45],
       [54, 55]])

>>> a[:,2]
array([2,12,22,32,42,52])

>>> a[2::2,::2]
array([[20,22,24]
       [40,42,44]])
```



numpy tutorial

In Pairs or Triples...

	0	1	2	3	4	5	6	7	8	9
0										
1										
2										
3										
4										
5										
6										
7										
8										
9										

1. Design a 10 by 10 logo for Hunter College that contains a purple 'H'.

In Pairs or Triples...

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1. Design a 10 by 10 logo for Hunter College that contains a purple 'H'.
2. Your logo should only contain the colors purple and white.

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1. Design a 10 by 10 logo for Hunter College that contains a purple 'H'.
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   Write down a "To Do" list of things you need to do.

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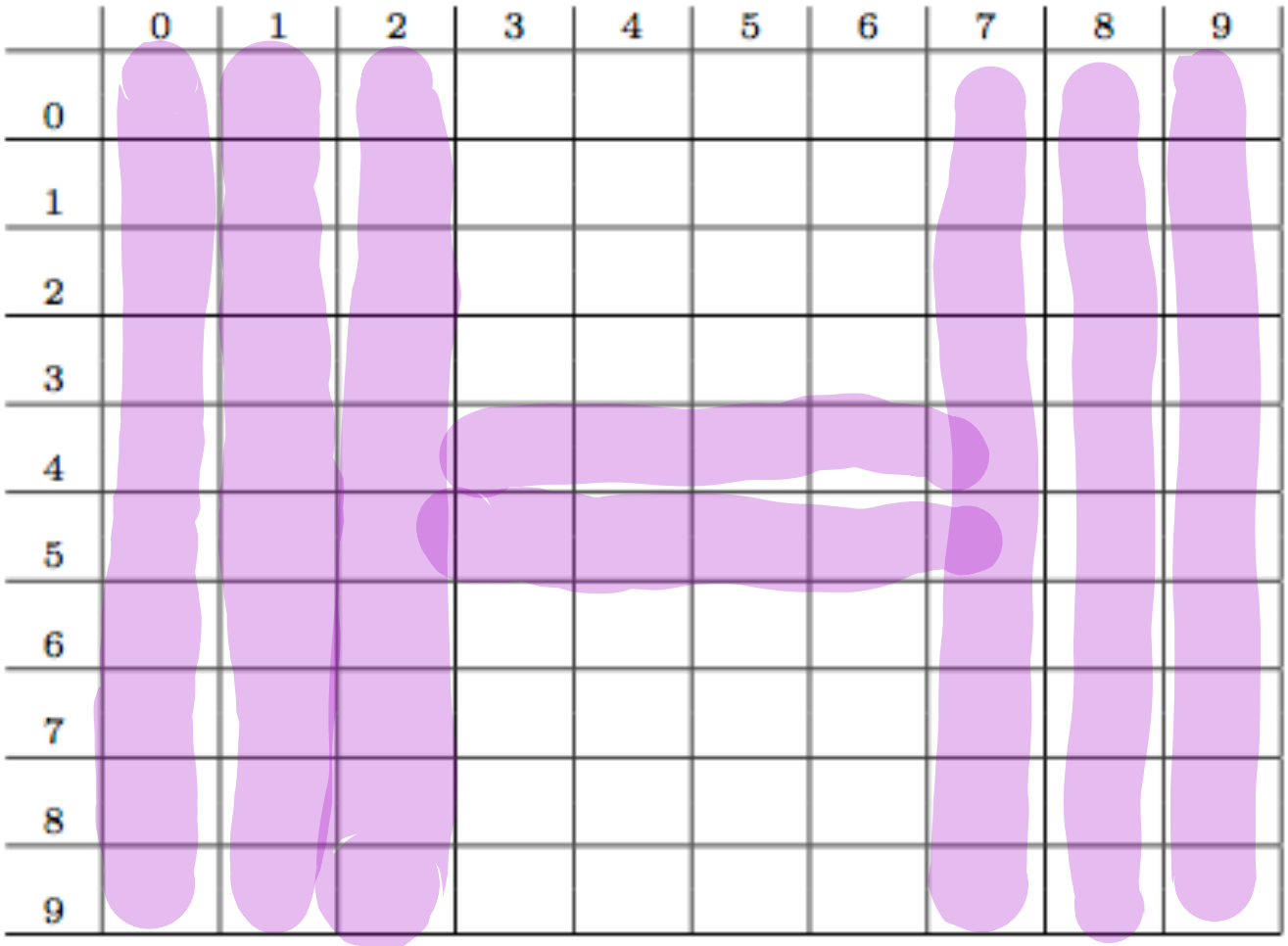
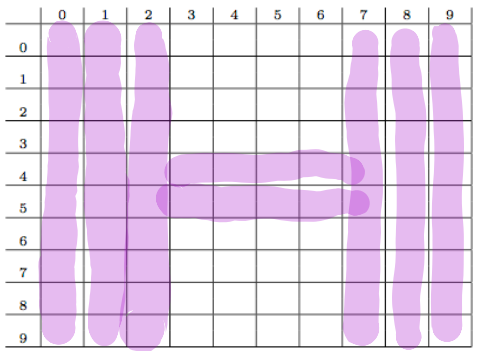
1. Design a 10 by 10 logo for Hunter College that contains a purple 'H'.
2. Your logo should only contain the colors purple and white.
3. How can you make Python draw the logo?
   Write down a "To Do" list of things you need to do.
4. If time, refine your steps above into a Python program.

Design a Hunter Logo

One possible solution:



Design a Hunter Logo



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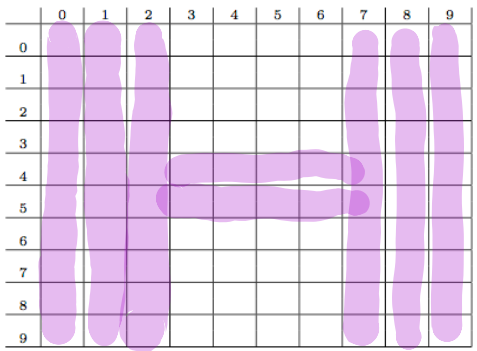

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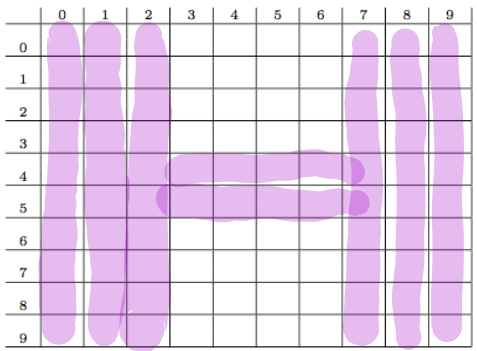

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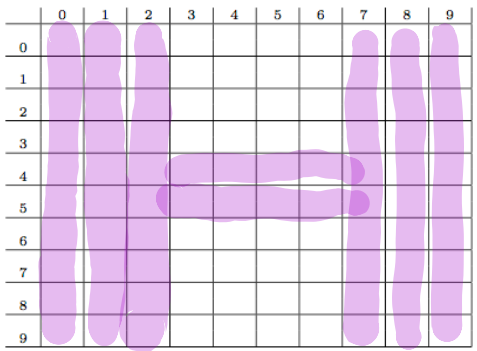

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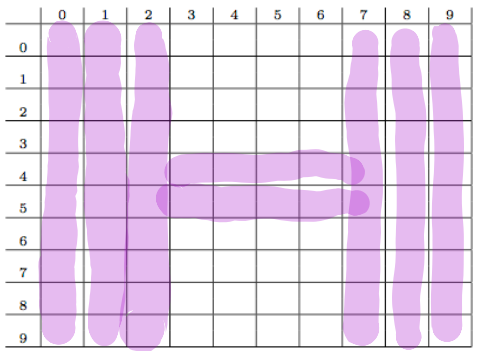

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Translating the Design to Code

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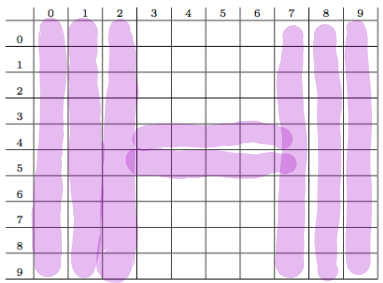

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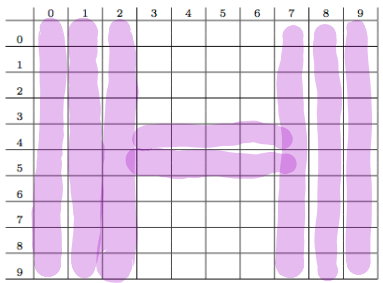

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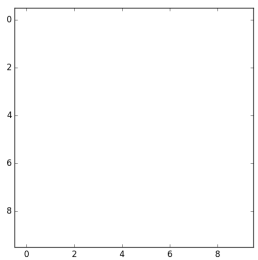

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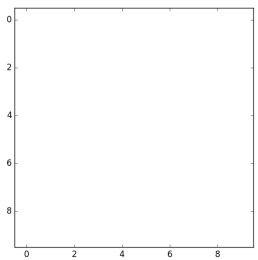

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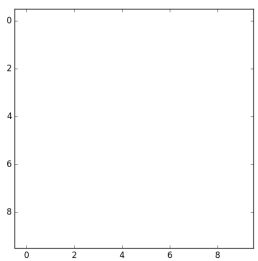

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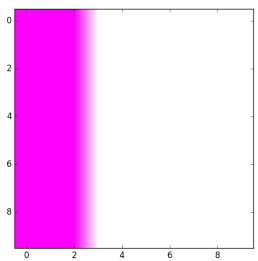

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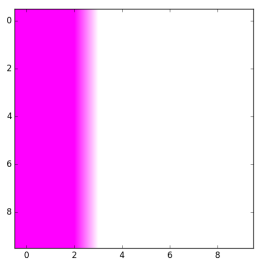

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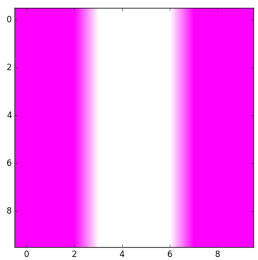

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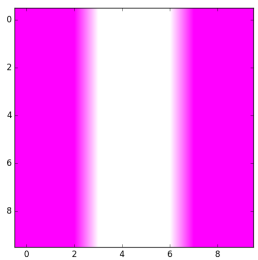

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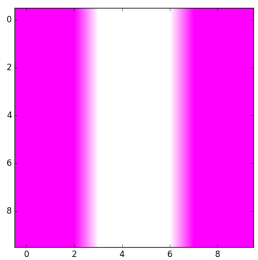

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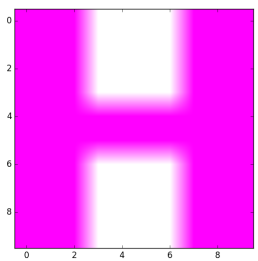

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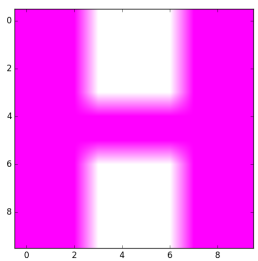

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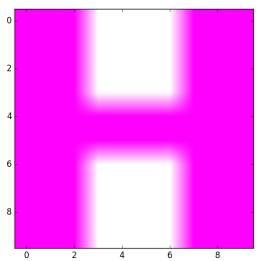

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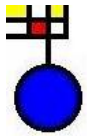
```
plt.imsave("logo.png", logoImg) #Save the image to logo.png
```

CS Survey: Prof. Sakas, Computational Linguistics

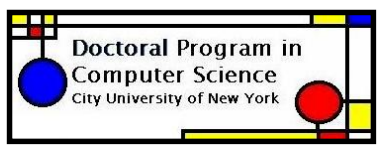


Language is Hard for Computers

Learning Language is Easy for my 3-year-old twins

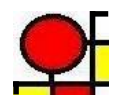
CSCI 12700 Guest Bullet Talk

William Gregory Sakas



HUNTER
The City University of New York

M.A./Ph.D. Program in Linguistics
@ The City University of New York



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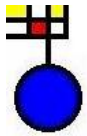
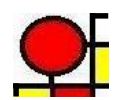


Language is Hard

- *Buffalo buffalo, Buffalo buffalo buffalo, buffalo, Buffalo buffalo*

- *Someone shot the servant of the actress who was on the balcony.* **Who was on the balcony?**

- *Who do you think Mary kissed?*
- *Who do you think* ***that*** *Mary kissed?*
- *Who do you think bought a radio?*
- ****** *Who do you think* ***that*** *bought a radio?*



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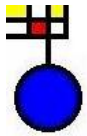


So how to explain language?

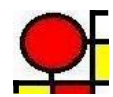
Treat Language as a **scientific field - like Physics.**

Example: *A* scientific principle about sentences:

Given <p> = [α [H β]],
where α = edge(*Spec's*) β then:
the head H of <p> is inert after the phase is completed, triggering no further grammatical operations.

Language is complex!!!
Understanding how language works is hard!!!

Unless you're 3.



CS Survey: Prof. Sakas, Computational Linguistics

Linguistic experts!

Lecture Slip

Linguistic experts!

Design a program that counts the number of plural nouns in a list of nouns. Think about:

- what the input is,
- what the output is, and
- how you can determine if a noun is plural.

Note: To simplify the problem, assume all plural nouns end in "s".

Recap

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

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  - 2D Arrays & Image Files

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
  - 2D Arrays & Image Files
- 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

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Practice Quiz & Final Questions

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- Lightning rounds:
  - write as much you can for 60 seconds;

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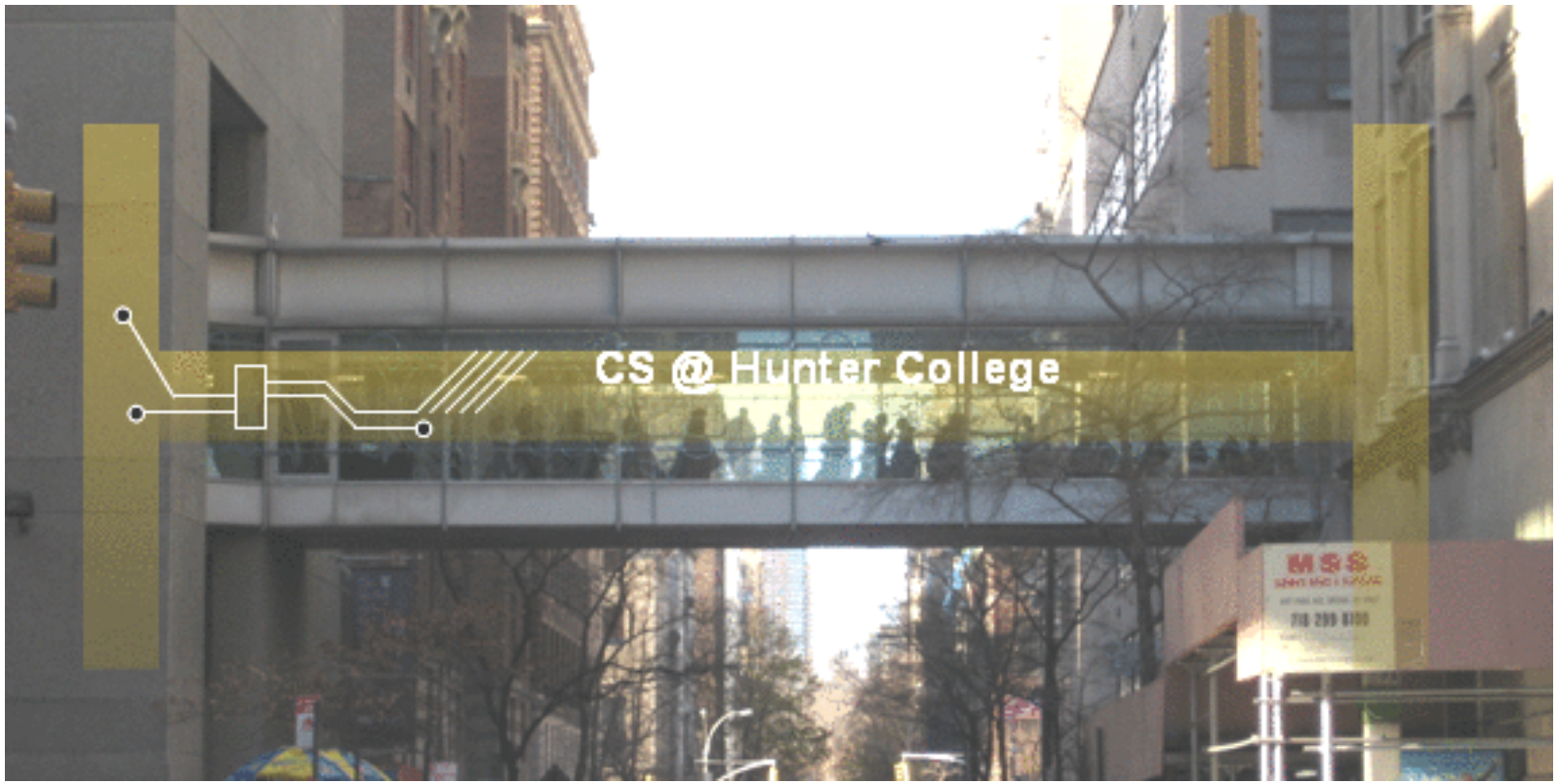
  - write as much you can for 60 seconds;
  - followed by answer; and
  - repeat.
- Past exams are on the webpage (under Final Exam Information).

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...