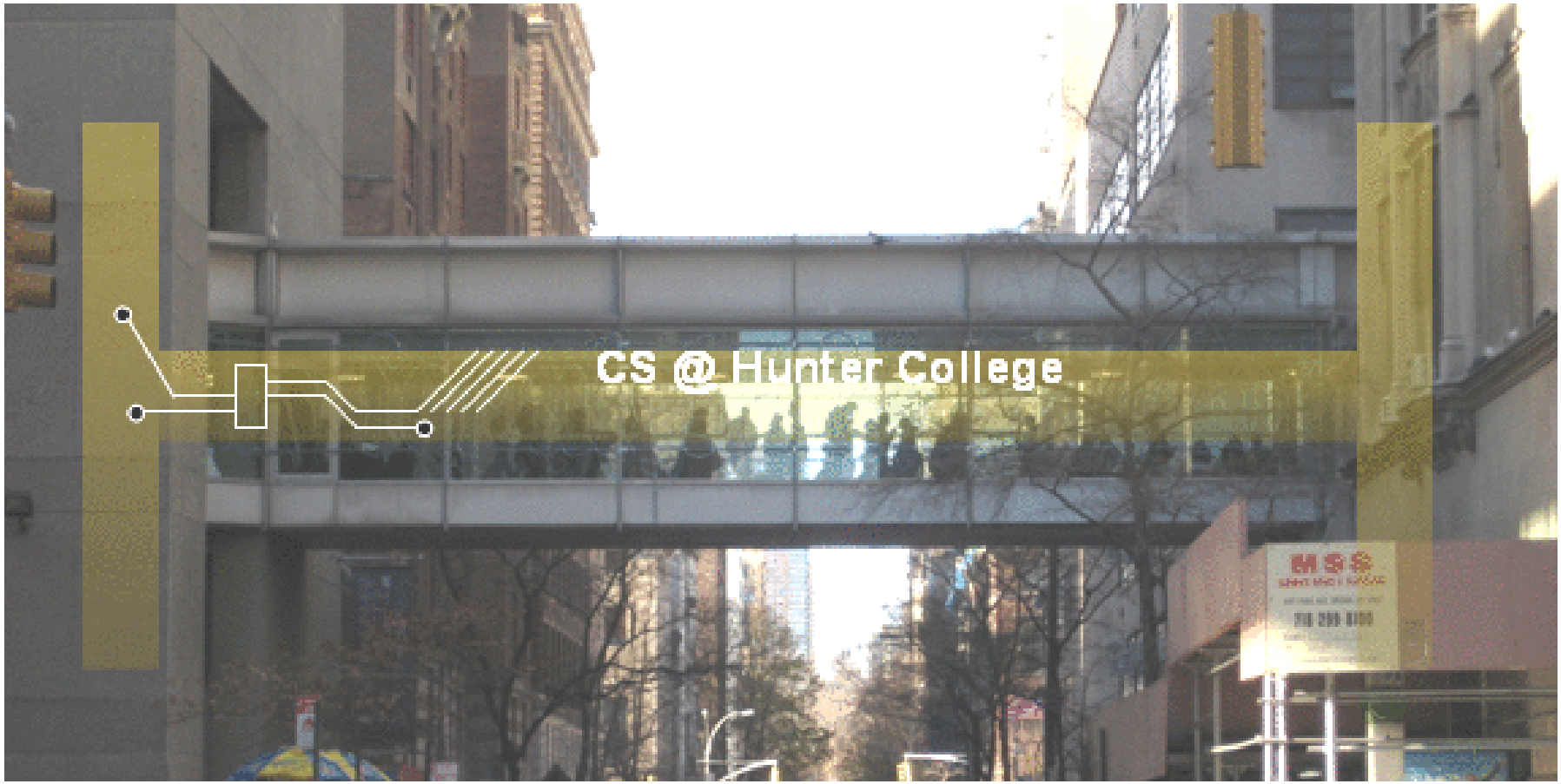
CSci 127: Introduction to Computer Science



hunter.cuny.edu/csci

Announcements

- CS Survey:

  Today: Bernard Desert & Elise Harris, CUNY 2X & Tech Talent Pipeline

Frequently Asked Questions

From lecture slips & recitation sections.

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  The colon, :, gives a slice, substring or sublist, ex: `myString[3:5]`.

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  They are Python files that includes useful functions, definitions, etc.
- Could you spend more time on problem solving & algorithms?
  Yes! More in upcoming lectures & labs.

Today's Topics

- Recap: Colors
- Indexing and Slicing
- Design Question: Cropping Images
- Decisions

Recap: Colors

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

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    - ★ White: 100% red, 100% green, 100% blue

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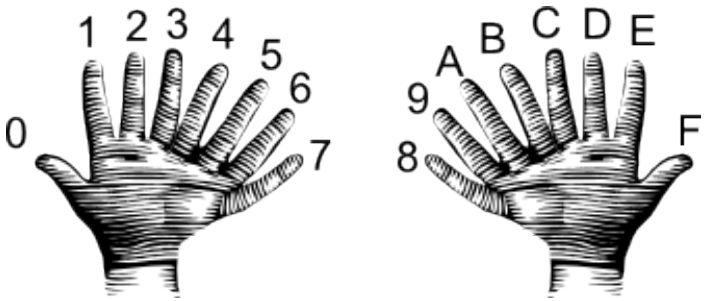
  - Hexcodes (base-16 numbers)...

Recap: 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
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
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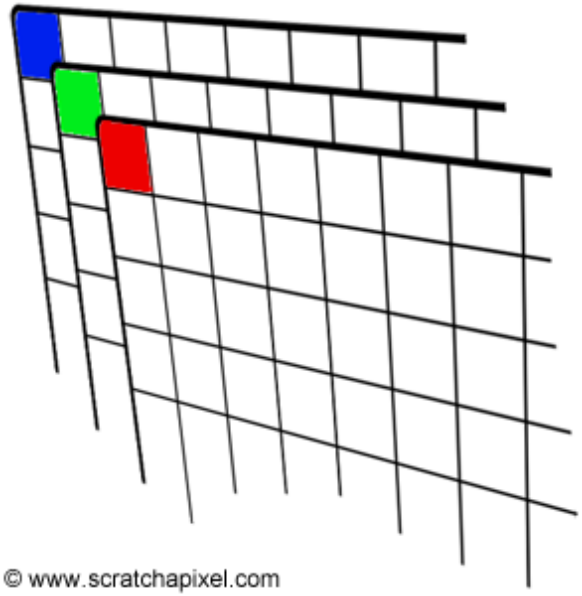

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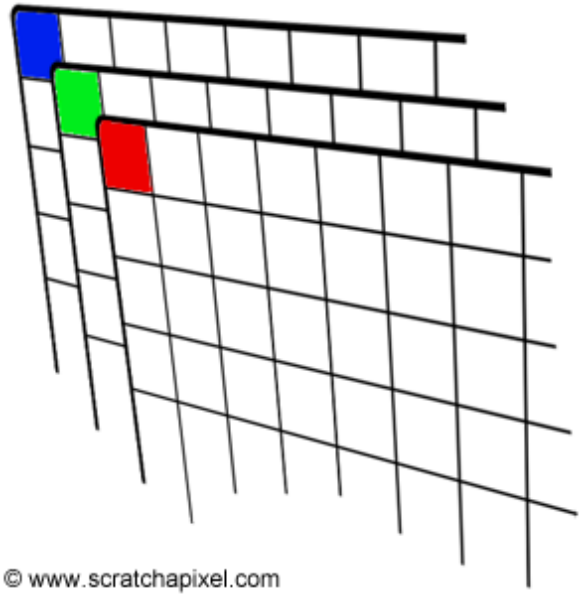

`img[i,j,0]`

`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).

In Pairs or Triples...

Let's start with loops & slices:

```
word = "Hunter"
for i in range(2,10,3):
    for c in word:
        print(i,c, end = "")
    print()

pali = "a man a plan a canal Panama"
print(pali[0], pali[-1])
print(pali[2:5], pali[-4:-1])

qPop = [152999,284041,469042,1079129,1297634,
    1550849,1809578,1986473,1891325,1951598,
    2229379,2230722]
print("Queens population in 1900:", qPop[0])
print("Since 2000:", qPop[-3:len(qPop)])
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Python Tutor

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  Inputs: name of file to be read in,
  name of file to saved, and
  the upper, lower, left, right coordinates ("bounding box")
  Outputs: cropped file.

Design: Cropping Images

- First: specify inputs/outputs. *Input file name, output file name, upper, lower, left, right ("bounding box") & output cropped file.*
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  1. Import numpy and pyplot.

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  1. Import numpy and pyplot.
  2. Ask user for file names and dimensions for cropping.

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  1. Import numpy and pyplot.
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  3. Save input file to an array.

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- **If time: translate to Python.**

Design: Cropping Images

```
#Name:  CSci 127 Teaching Staff
#Date:  Fall 2017
#This program loads an image, displays it, and then creates, displays,
#    and saves a new image that has only the red channel displayed.

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

inImg = input('Enter input image: ')
img = plt.imread(inImg)  #Read in image from csBridge.png
plt.imshow(img)          #Load image into pyplot
plt.show()               #Show the image (waits until closed to continue)

outImg = input('Enter out image: ')
t = int(input('Enter top:'))
b = int(input('Enter bottom:'))
l = int(input('Enter left: '))
r = int(input('Enter right: '))

img2 = img[t:b,l:r]      #Slice the original array by dimensions entered

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

plt.imsave(outImg, img2) #Save the image we created to the out file.
```

In Pairs or Triples...

Predict what these will do (novel concepts):

```
yearBorn = int(input('Enter year born: '))
if yearBorn < 1946:
    print("Greatest Generation")
elif yearBorn <= 1964:
    print("Baby Boomer")
elif yearBorn <= 1984:
    print("Generation X")
elif yearBorn <= 2004:
    print("Millennial")
else:
    print("TBD")

x = int(input('Enter number: '))
if x % 2 == 0:
    print('Even number')
else:
    print('Odd number')
```

```
import turtle

tess = turtle.Turtle()
myWin = turtle.Screen()     #The graphics window
commands = input("Please enter a command string: ")

for ch in commands:
    #perform action indicated by the character
    if ch == 'F':           #move forward
        tess.forward(50)
    elif ch == 'L':         #turn left
        tess.left(90)
    elif ch == 'R':         #turn right
        tess.right(90)
    elif ch == '^':         #lift pen
        tess.penup()
    elif ch == 'v':         #lower pen
        tess.pendown()
    elif ch == 'B':         #go backwards
        tess.backward(50)
    elif ch == 'r':         #turn red
        tess.color("red")
    elif ch == 'g':         #turn green
        tess.color("green")
    elif ch == 'b':         #turn blue
        tess.color("blue")
    else:                   #for any other character
        print("Error: do not know the command:", c)
```

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IDLE

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        tess.penup()
    elif ch == 'v':         #lower pen
        tess.pendown()
    elif ch == 'B':         #go backwards
        tess.backward(50)
    elif ch == 'r':         #turn red
        tess.color("red")
    elif ch == 'g':         #turn green
        tess.color("green")
    elif ch == 'b':         #turn blue
        tess.color("blue")
    else:                   #for any other character
        print("Error: do not know the command:", c)
```

(Demo with IDLE)

Decisions

```
if x < y:
    print("x is less than y")
elif x > y:
    print("x is greater than y")
else:
    print("x and y must be equal")
```

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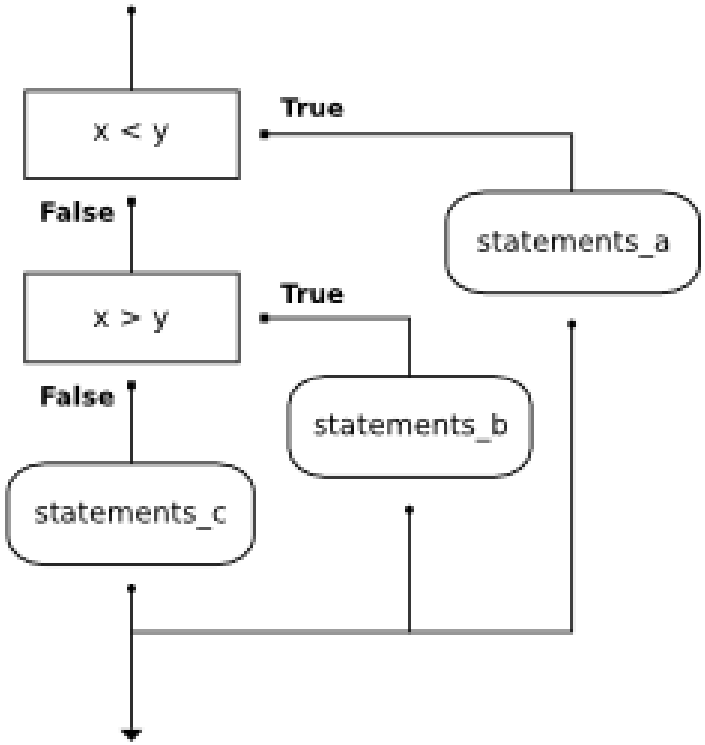

Decisions

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else:
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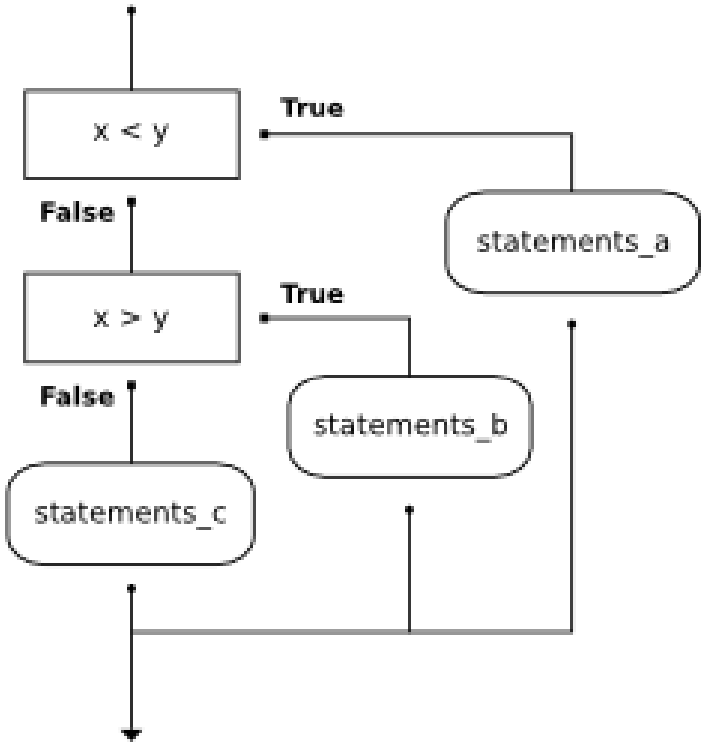
```



(This was just a first glance, will do much more on decisions over the next several weeks.)

CS Survey Talk: CUNY2X & TTP @Hunter

Bernard Desert & Elise Harris

CS Survey Talk: CUNY2X & TTP @Hunter

Bernard Desert & Elise Harris

- Brief overview of CUNY 2X & Tech Talent Pipeline

CS Survey Talk: CUNY2X & TTP @Hunter

Bernard Desert & Elise Harris

- Brief overview of CUNY 2X & Tech Talent Pipeline
- What Bernard & Elise love about their jobs.

CS Survey Talk: CUNY2X & TTP @Hunter

Bernard Desert & Elise Harris

- Brief overview of CUNY 2X & Tech Talent Pipeline
- What Bernard & Elise love about their jobs.
- Design challenge: classic tech interview question.

Tech Interview Classic

- Write a program that prints the numbers from 1 to 100. But for multiples of three print "Fizz" instead of the number and for the multiples of five print "Buzz". For numbers which are multiples of both three and five print "FizzBuzz".

Tech Interview Classic

- Write a program that prints the numbers from 1 to 100. But for multiples of three print "Fizz" instead of the number and for the multiples of five print "Buzz". For numbers which are multiples of both three and five print "FizzBuzz".
- Write down the output to see the pattern:

Tech Interview Classic

- Write a program that prints the numbers from 1 to 100. But for multiples of three print "Fizz" instead of the number and for the multiples of five print "Buzz". For numbers which are multiples of both three and five print "FizzBuzz".
- Write down the output to see the pattern:
  1

Tech Interview Classic

- Write a program that prints the numbers from 1 to 100. But for multiples of three print "Fizz" instead of the number and for the multiples of five print "Buzz". For numbers which are multiples of both three and five print "FizzBuzz".
- Write down the output to see the pattern:
  1
  2

Tech Interview Classic

- Write a program that prints the numbers from 1 to 100. But for multiples of three print "Fizz" instead of the number and for the multiples of five print "Buzz". For numbers which are multiples of both three and five print "FizzBuzz".
- Write down the output to see the pattern:
  1
  2
  Fizz

Tech Interview Classic

- Write a program that prints the numbers from 1 to 100. But for multiples of three print "Fizz" instead of the number and for the multiples of five print "Buzz". For numbers which are multiples of both three and five print "FizzBuzz".
- Write down the output to see the pattern:
  1
  2
  Fizz
  4

Tech Interview Classic

- Write a program that prints the numbers from 1 to 100. But for multiples of three print "Fizz" instead of the number and for the multiples of five print "Buzz". For numbers which are multiples of both three and five print "FizzBuzz".
- Write down the output to see the pattern:
  1
  2
  Fizz
  4
  Buzz

Tech Interview Classic

- Write a program that prints the numbers from 1 to 100. But for multiples of three print "Fizz" instead of the number and for the multiples of five print "Buzz". For numbers which are multiples of both three and five print "FizzBuzz".
- Write down the output to see the pattern:
  1
  2
  Fizz
  4
  Buzz
  5

Tech Interview Classic

- Write a program that prints the numbers from 1 to 100. But for multiples of three print "Fizz" instead of the number and for the multiples of five print "Buzz". For numbers which are multiples of both three and five print "FizzBuzz".
- Write down the output to see the pattern:
  1
  2
  Fizz
  4
  Buzz
  5
  Fizz

Tech Interview Classic

- Write a program that prints the numbers from 1 to 100. But for multiples of three print "Fizz" instead of the number and for the multiples of five print "Buzz". For numbers which are multiples of both three and five print "FizzBuzz".
- Write down the output to see the pattern:
  1
  2
  Fizz
  4
  Buzz
  5
  Fizz
  7

Tech Interview Classic

- Write a program that prints the numbers from 1 to 100. But for multiples of three print "Fizz" instead of the number and for the multiples of five print "Buzz". For numbers which are multiples of both three and five print "FizzBuzz".
- Write down the output to see the pattern:
  1
  2
  Fizz
  4
  Buzz
  5
  Fizz
  7
  ...
  14

Tech Interview Classic

- Write a program that prints the numbers from 1 to 100. But for multiples of three print "Fizz" instead of the number and for the multiples of five print "Buzz". For numbers which are multiples of both three and five print "FizzBuzz".
- Write down the output to see the pattern:
  1
  2
  Fizz
  4
  Buzz
  5
  Fizz
  7
  ...
  14
  FizzBuzz

Tech Interview Classic

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- To Do List:

Tech Interview Classic

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- To Do List:
  - Create a loop that goes from 1 to 100.

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- To Do List:
  - Create a loop that goes from 1 to 100.
  - If the number is divisible by 3, print "Fizz".

Tech Interview Classic

- Write a program that prints the numbers from 1 to 100. But for multiples of three print "Fizz" instead of the number and for the multiples of five print "Buzz". For numbers which are multiples of both three and five print "FizzBuzz".
- To Do List:
  - Create a loop that goes from 1 to 100.
  - If the number is divisible by 3, print "Fizz".
  - If the number is divisible by 5, print "Buzz".

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  - **Otherwise print the number.**

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  - If divisible by both, print "FizzBuzz".
  - **Otherwise print the number.**
    We should do this one first!

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- Write a program that prints the numbers from 1 to 100. But for multiples of three print "Fizz" instead of the number and for the multiples of five print "Buzz". For numbers which are multiples of both three and five print "FizzBuzz".
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for i in range(1,101):
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Tech Interview Classic

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  - Create a loop that goes from 1 to 100.
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```
for i in range(1,101):
    if i%3 != 0 and i%5 != 0:
```

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- To Do List:
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```
for i in range(1,101):
    if i%3 != 0 and i%5 != 0:
         print(i, end="")
    if i%3 == 0:
```

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- To Do List:
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    if i%5 == 0:
```

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- One solution (uses `print(,end="")` that prints all on the same line):

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for i in range(1,101):
    if i%3 != 0 and i%5 != 0:
        print(i, end="")
    if i%3 == 0:
        print("Fizz", end="")
    if i%5 == 0:
        print("Buzz", end="")
    print()
```

Recap

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  - Indexing and Slicing
  - Design Question: Cropping Images
  - Decisions

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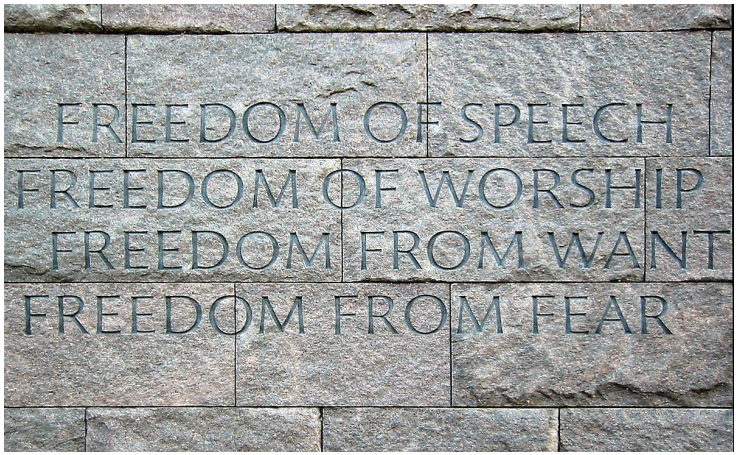
Practice Quiz & Final Questions

(NYTimes)

(Hunter College)



(FDR 4 FP)

- 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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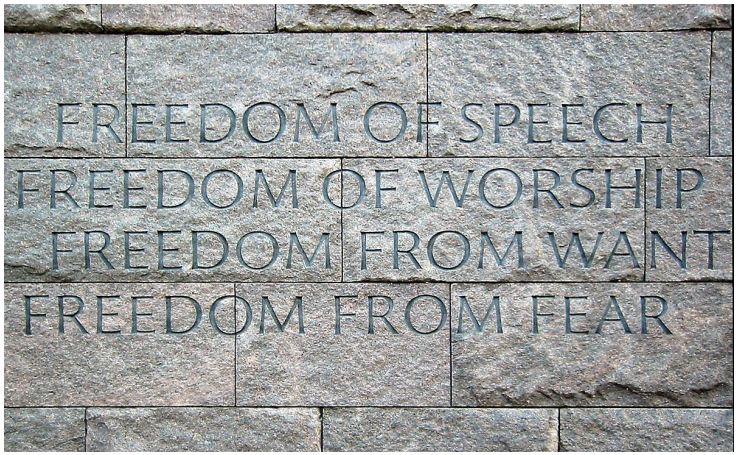


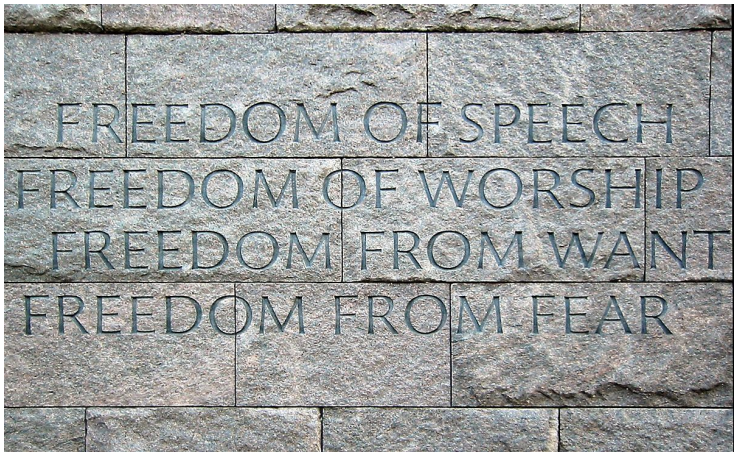
(FDR 4 FP)

- 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

(NYTimes)

(Hunter College)



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

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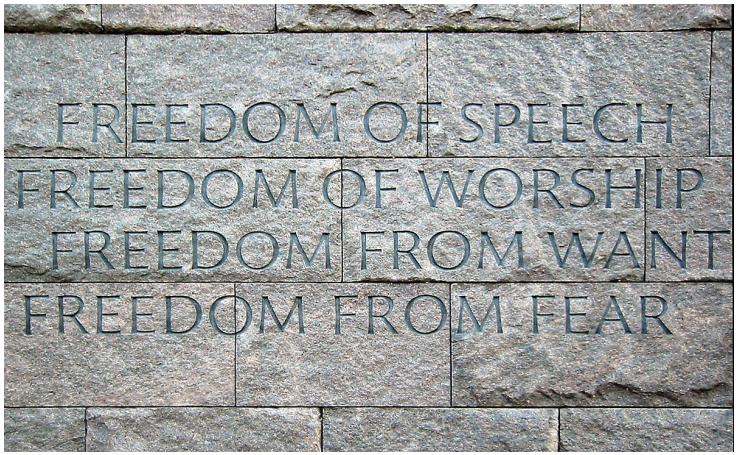


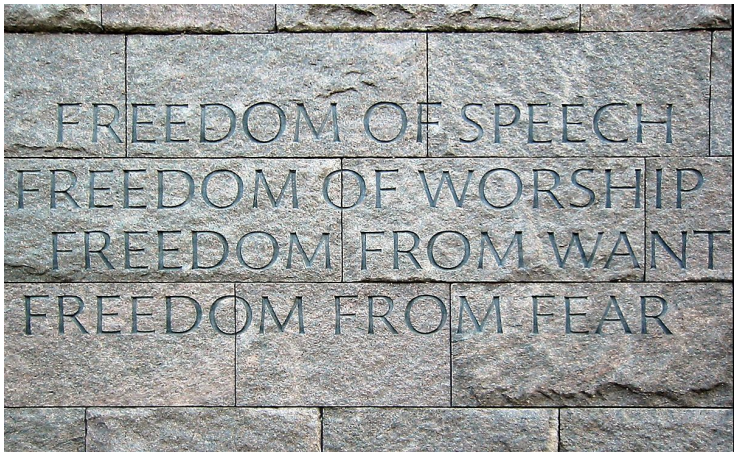
(FDR 4 FP)

- 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

(NYTimes)

(Hunter College)



(FDR 4 FP)

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  - write as much you can for 60 seconds;
  - followed by answer; and

Practice Quiz & Final Questions

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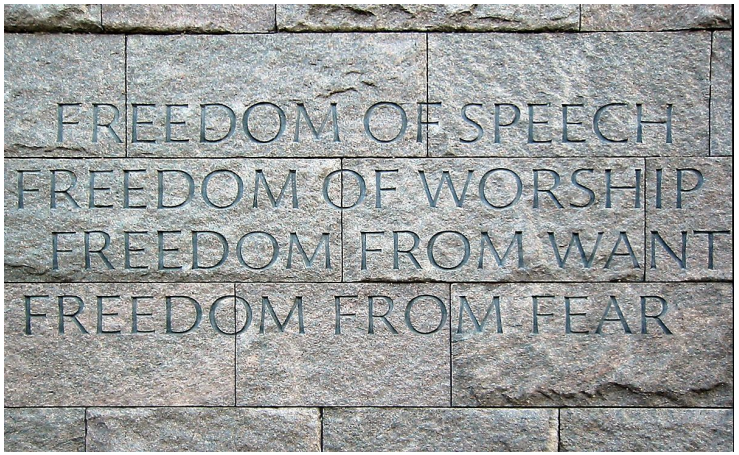

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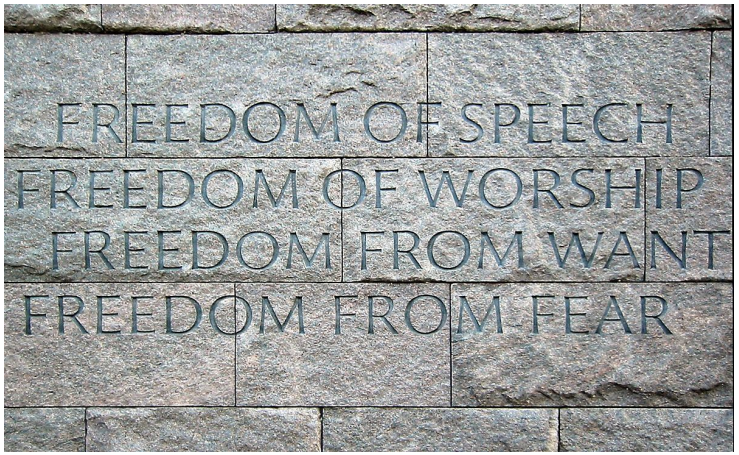

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- Past exams are on the webpage (under Final Exam Information).

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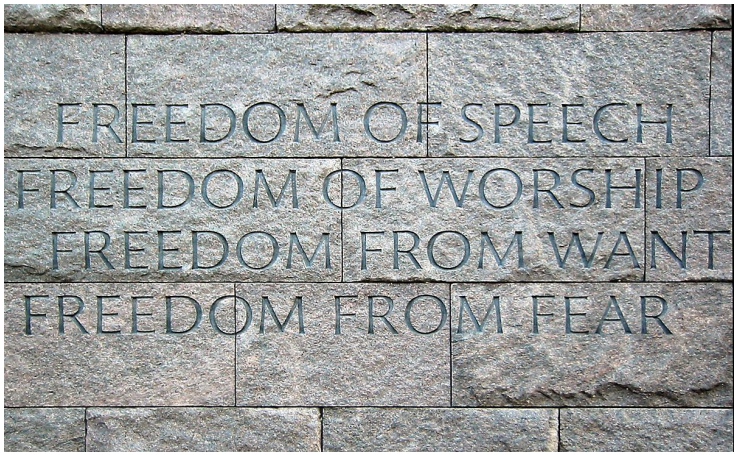
(Hunter College)



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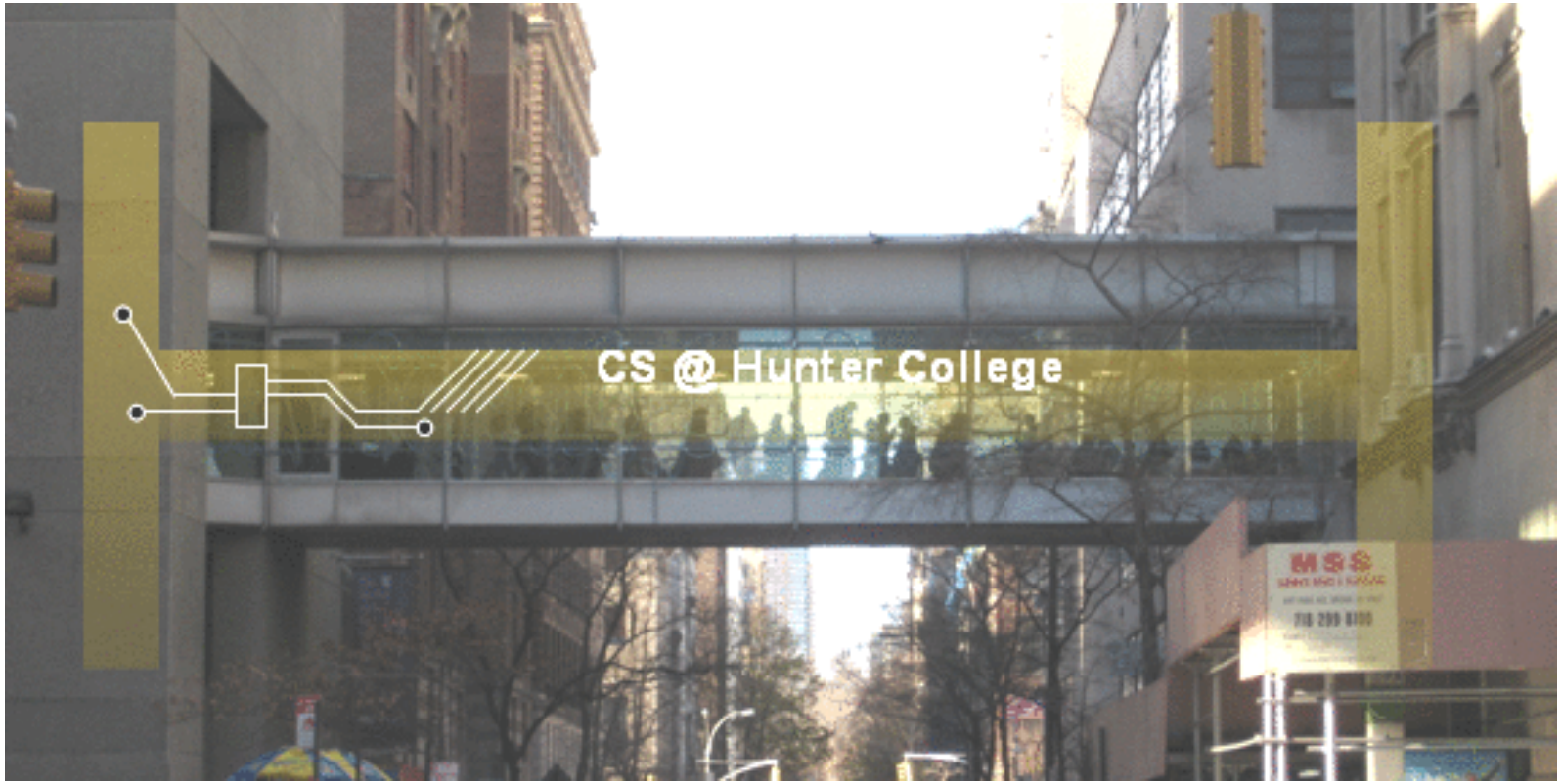
- Pull out something to write on (not to be turned in).
- Lightning rounds:
  - write as much you can for 60 seconds;
  - followed by answer; and
  - repeat.
- Past exams are on the webpage (under Final Exam Information).
- We're starting with Fall 2017, Version 3.

Writing Boards



- Return writing boards as you leave...