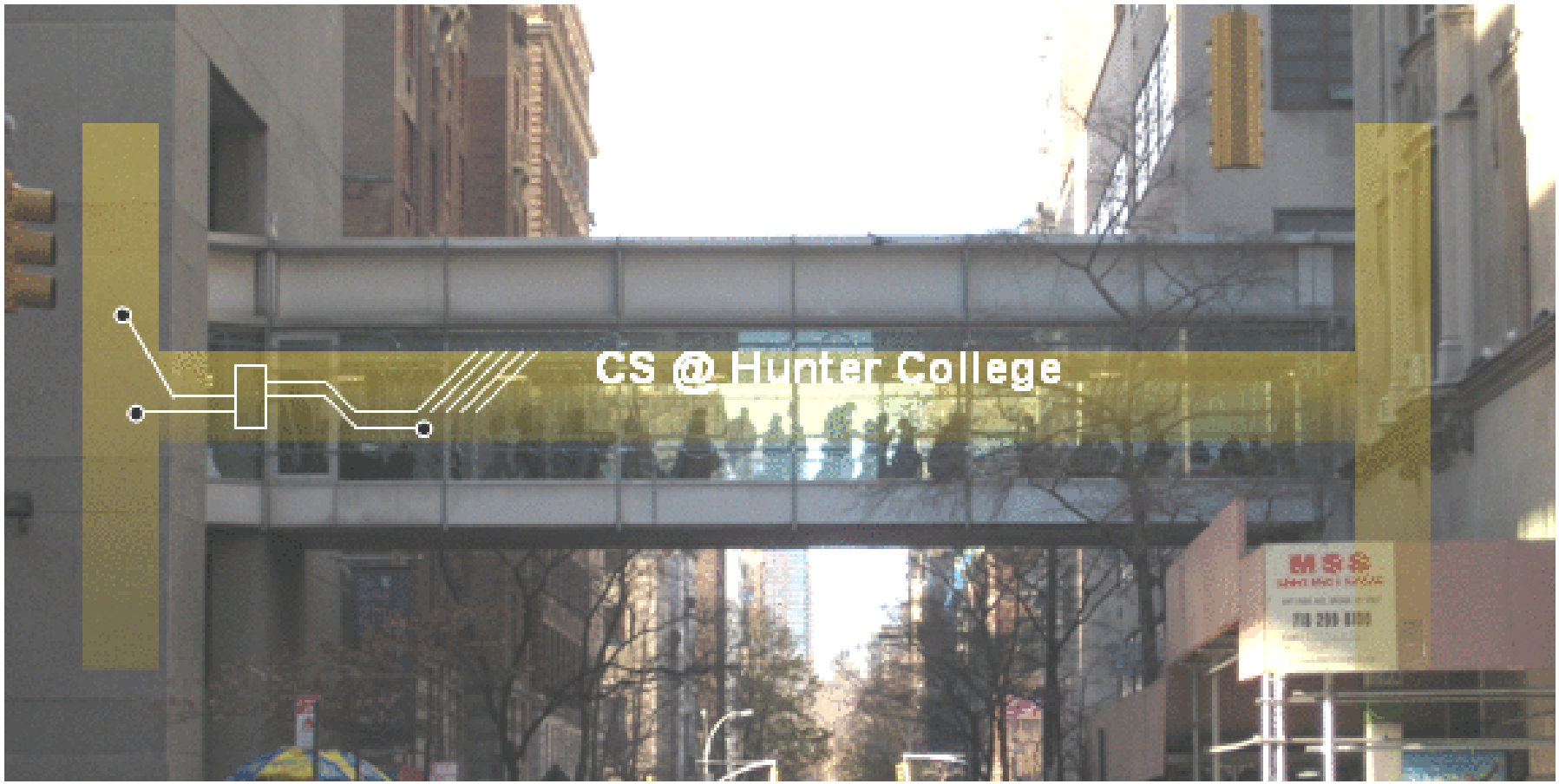
CSci 127: Introduction to Computer Science



hunter.cuny.edu/csci

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Frequently Asked Questions

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- **How can I tell strings from variables?**
  Strings are surrounded by quotes (either single or double).
  Variables names (identifiers) for memory locations are not. Ex: `'num'` *vs.* `num`.

Today's Topics

- Recap: Decisions
- Logical Expressions
- Circuits
- Binary Numbers

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Challenge

Some challenges with types & decisions:

```
#What are the types:
y1 = 2017
y2 = "2018"
print(type(y1))
print(type("y1"))
print(type(2017))
print(type("2017"))
print(type(y2))
print(type(y1/4.0))

x = int(y2) - y1
if x < 0:
    print(y2)
else:
    print(y1)
```

```
cents = 432
dollars = cents // 100
change = cents % 100
if dollars > 0:
    print('$'+str(dollars))
if change > 0:
    quarters = change // 25
    pennies = change % 25
    print(quarters, "quarters")
    print("and", pennies, "pennies")
```

Python Tutor

```
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```

(Demo with pythonTutor)

Decisions

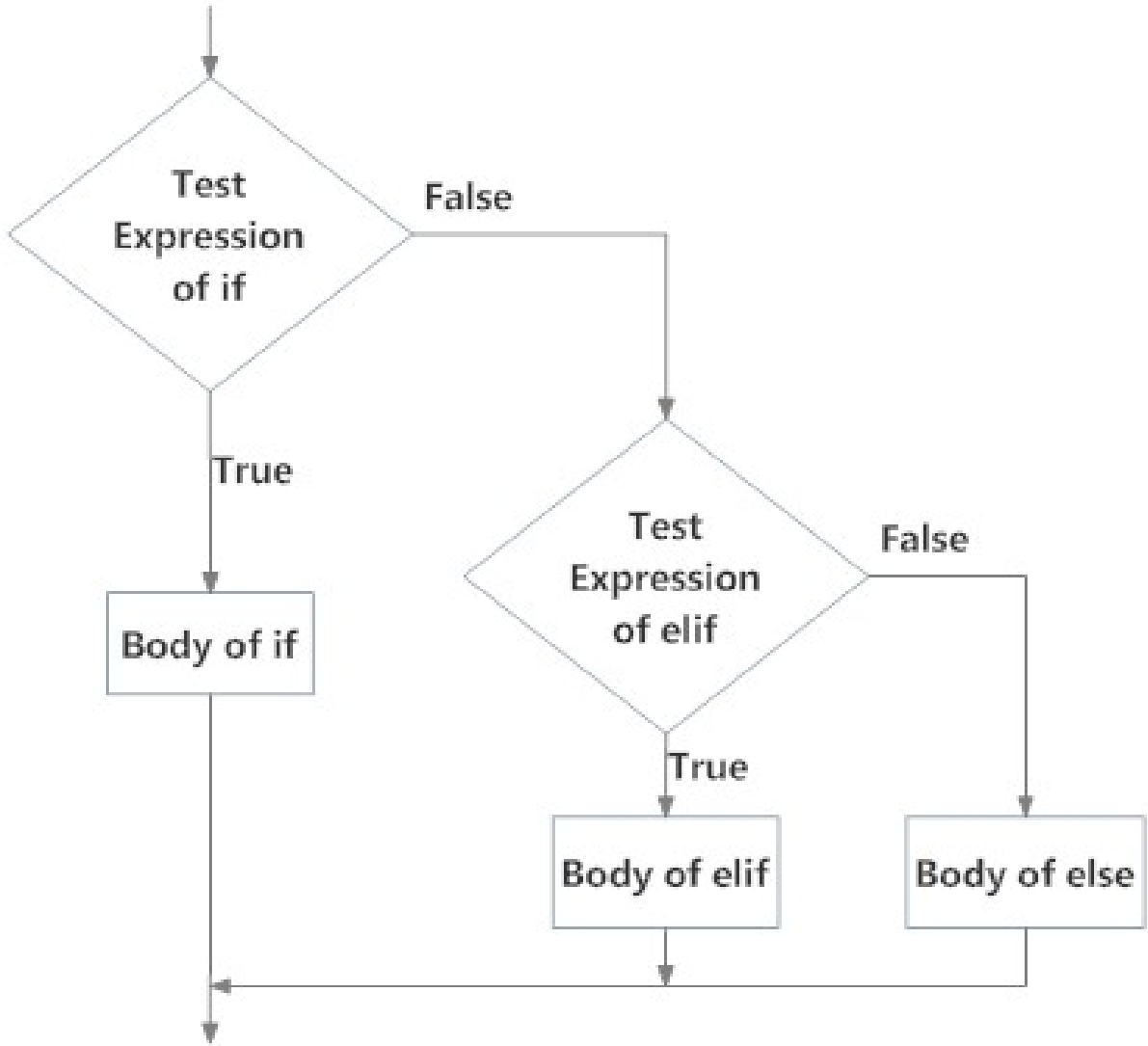
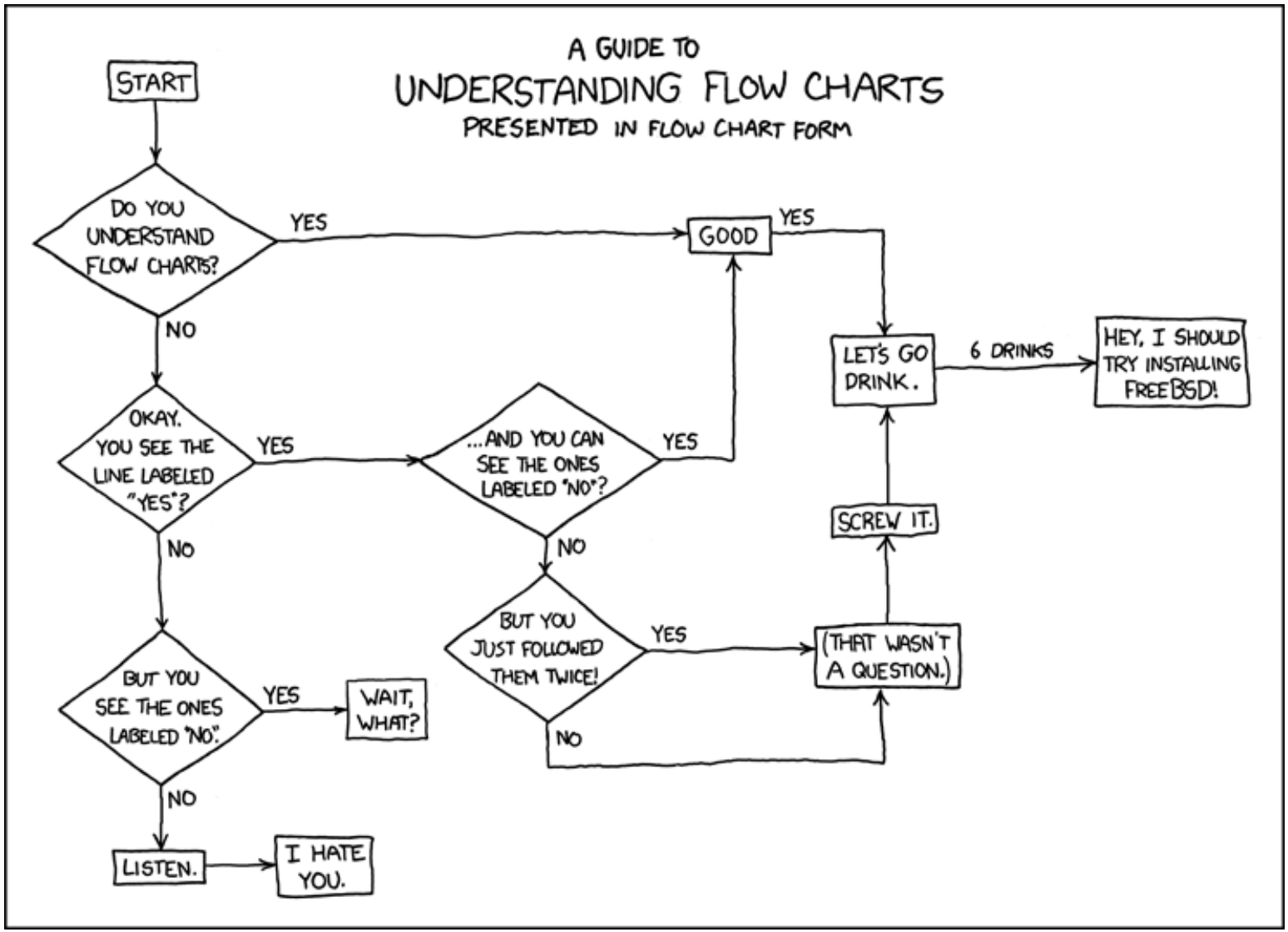


Fig: Operation of if...elif...else statement

(programiz)

Side Note: Reading Flow Charts



(xkcd/518)

Today's Topics

- Recap: Decisions
- **Logical Expressions**
- Circuits
- Binary Numbers

Challenge

Predict what the code will do:

```
origin = "Indian Ocean"
winds = 100
if (winds > 74):
    print("Major storm, called a ", end="")
    if origin == "Indian Ocean" or origin == "South Pacific":
        print("cyclone.")
    elif origin == "North Pacific":
        print("typhoon.")
    else:
        print("hurricane.")

visibility = 0.2
winds = 40
conditions = "blowing snow"
if (winds > 35) and (visibility < 0.25) and \
      (conditions == "blowing snow" or conditions == "heavy snow"):
    print("Blizzard!")
```

Python Tutor

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(Demo with `pythonTutor`)

Logical Operators

and

in1		in2	*returns:*
`False`	`and`	`False`	`False`
`False`	`and`	`True`	`False`
`True`	`and`	`False`	`False`
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or

in1		in2	*returns:*
`False`	`or`	`False`	`False`
`False`	`or`	`True`	`True`
`True`	`or`	`False`	`True`
`True`	`or`	`True`	`True`

Logical Operators

and

in1		in2	*returns:*
False	and	False	False
False	and	True	False
True	and	False	False
True	and	True	True

or

in1		in2	*returns:*
False	or	False	False
False	or	True	True
True	or	False	True
True	or	True	True

not

	in1	*returns:*
not	False	True
not	True	False

Challenge

Predict what the code will do:

```
semHours = 18
reqHours = 120
if semHours >= 12:
     print('Full Time')
else:
     print('Part Time')

pace = reqHours // semHours
if reqHours % semHours != 0:
     pace = pace + 1
print('At this pace, you will graduate in', pace, 'semesters,')
yrs = pace / 2
print('(or', yrs, 'years).')


for i in range(1,20):
     if (i > 10) and (i % 2 == 1):
          print('oddly large')
     else:
          print(i)
```

Python Tutor

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(Demo with pythonTutor)

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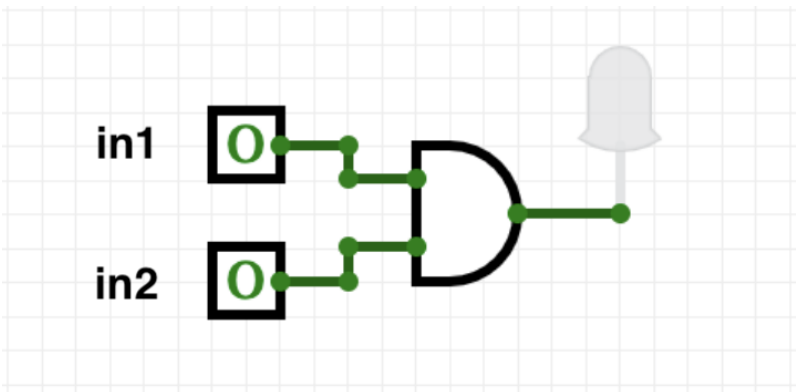
- **Circuits**
- Binary Numbers

Circuit Demo

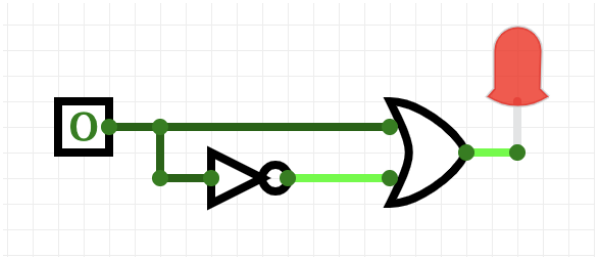


(Demo with `circuitverse`)

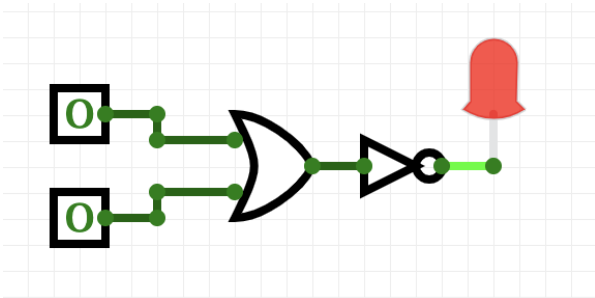
Challenge

Predict when these expressions are true:

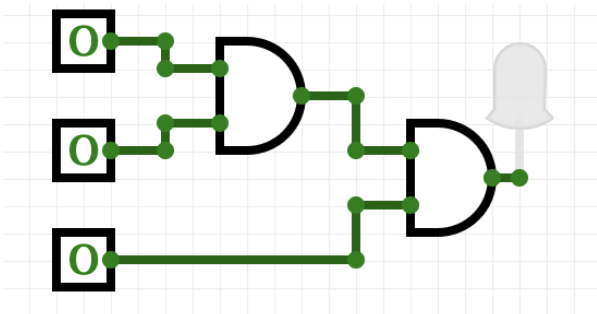
- `in1 or not in1`:



- `not(in1 or in2)`:



- `(in1 and in2) and in3`:



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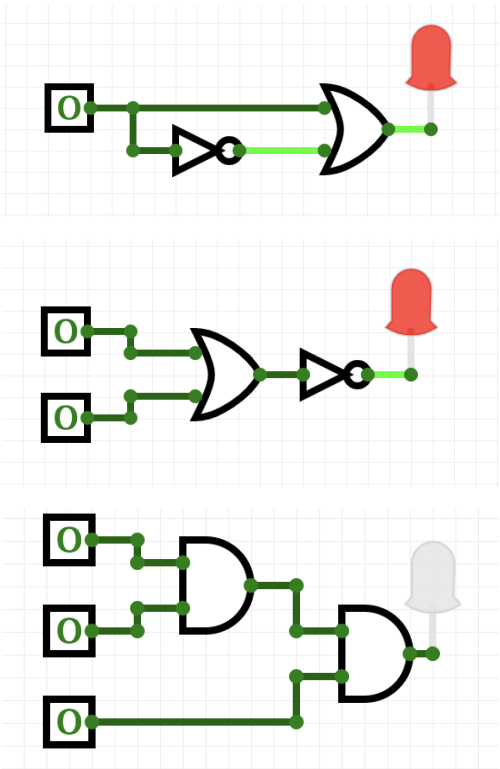

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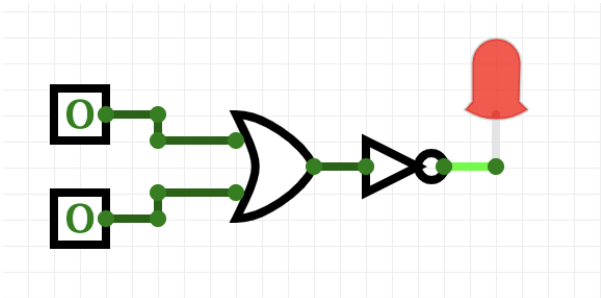
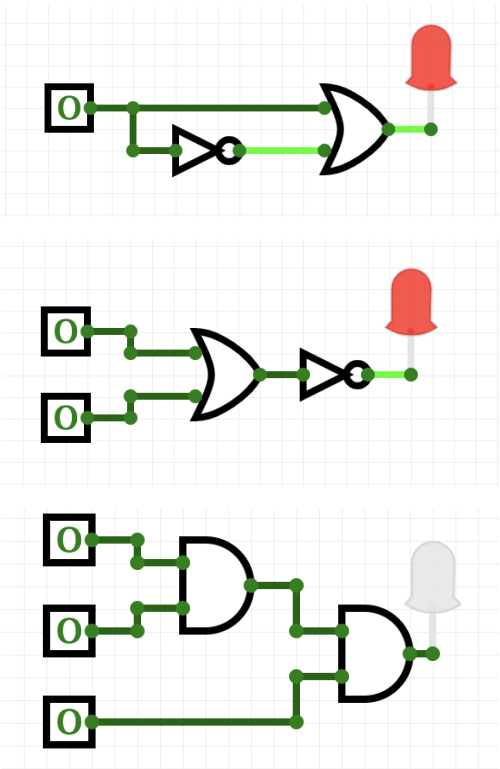


Draw a circuit that corresponds to each logical expression:

- `in1 or in2`
- `(in1 or in2) and (in1 or in3)`
- `(not(in1 and not in2)) or (in1 and (in2 and in3))`

Circuit Demo



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- Digital logic design allows for two states:
  - True / False
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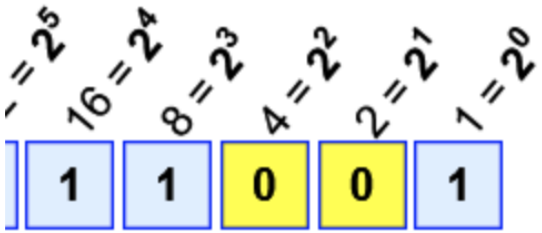
  - 1 / 0
- Computers store numbers using the Binary system (base 2)
- A **bit** (binary digit) being 1 (on) or 0 (off)

Binary Numbers



Example: 1×16 + 1×8 + 1×1 = 16+8+1 = 25

- Two digits: **0** and **1**

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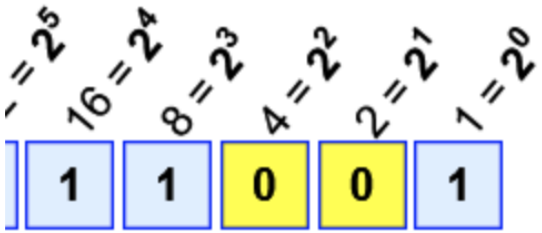

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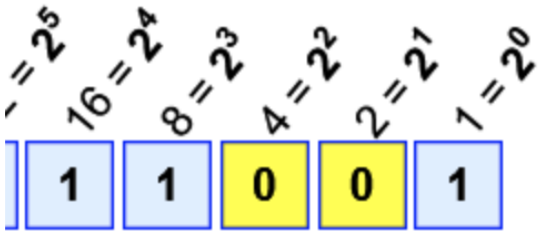

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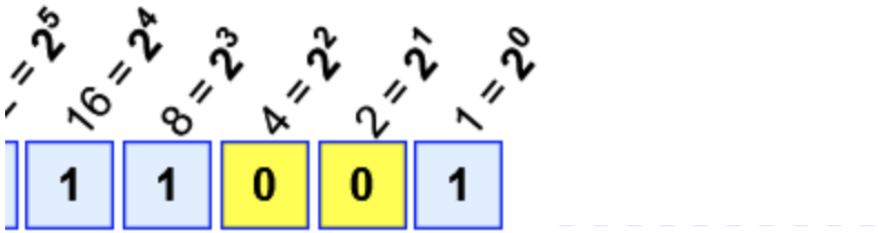

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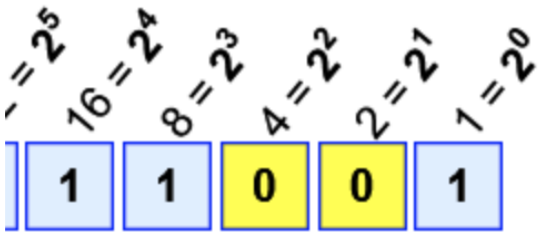

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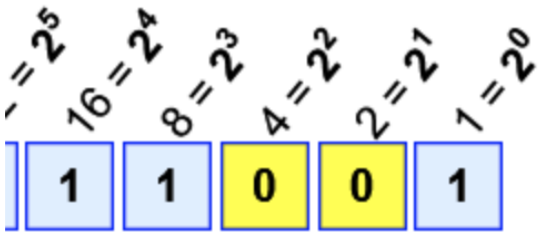

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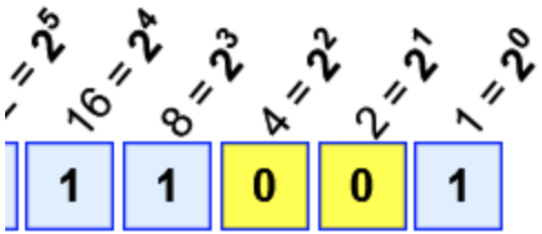

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  - In the "twos" position we either have a 2 or not

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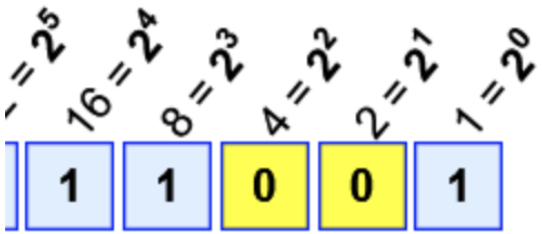

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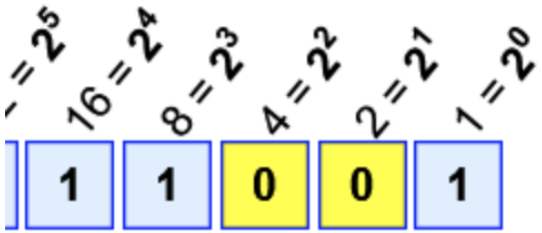
  - In the "fours" position we either have a 4 or not ...

Binary Numbers



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- **Example:**

$$11001_{base2} = 16 + 8 + 1 = 25_{base10}$$

Lecture Quiz

- Log-in to Gradescope
- Find LECTURE 5 Quiz
- Take the quiz
- **You have 3 minutes**

Challenge: 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”.

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  4

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- Write down the output to see the pattern:
  1
  2
  Fizz
  4
  Buzz

Challenge: 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
  Fizz

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- Write the **algorithm** then, if time, write the code.

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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”.

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  - **If divisible by both, print “FizzBuzz”.**

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  - Otherwise print the number.
    Order matters!!! To print FizzBuzz when i is divisible by both it should be checked first, otherwise it will never get to this case!

Tech Interview Classic

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Tech Interview Classic

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  - Create a loop that goes from 1 to 100.
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  - Also should print a new line (so each entry is on its own line).

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```
for i in range(1,101):
```

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

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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:
        print("FizzBuzz")
    elif i%3 == 0:
        print("Fizz")
```

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    elif i%3 == 0:
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    elif i%5 == 0:
        print("Buzz")
    else:
        print(i)
```

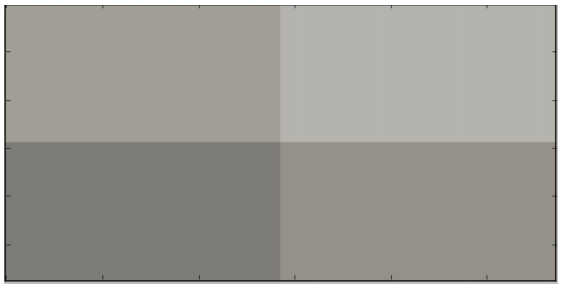
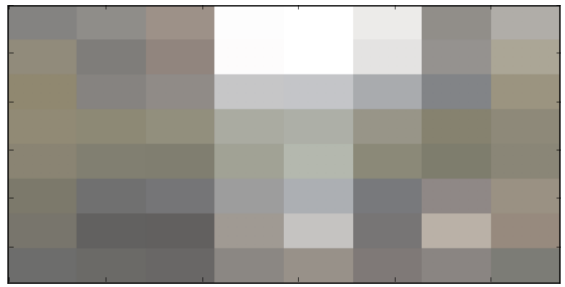
Recap

- In Python, we introduced:

Recap

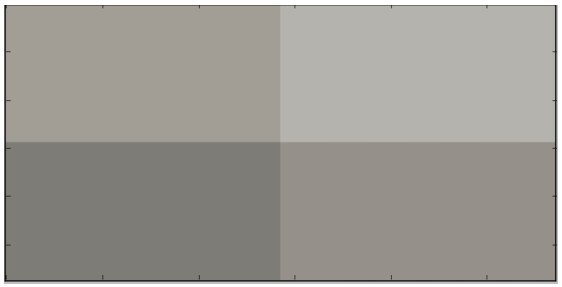
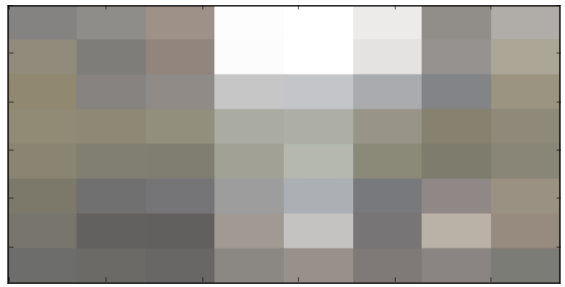
- In Python, we introduced:
  - Decisions
  - Logical Expressions
  - Circuits
  - Binary Numbers

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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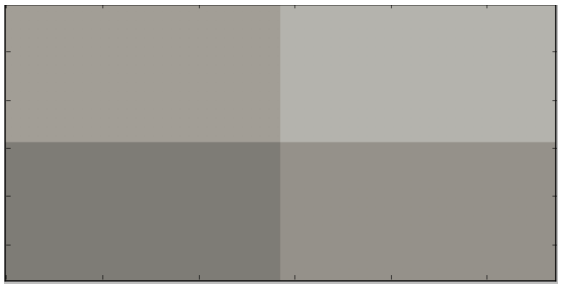
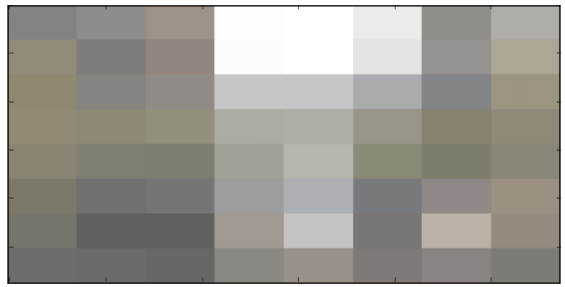


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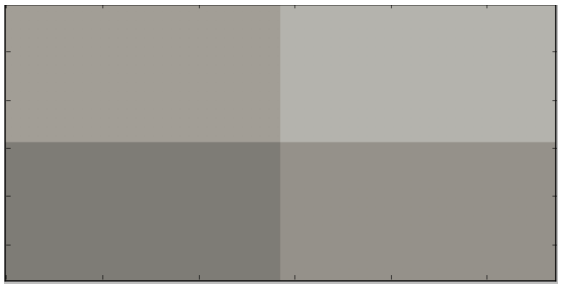
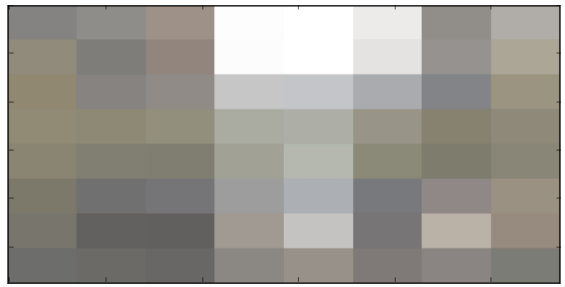


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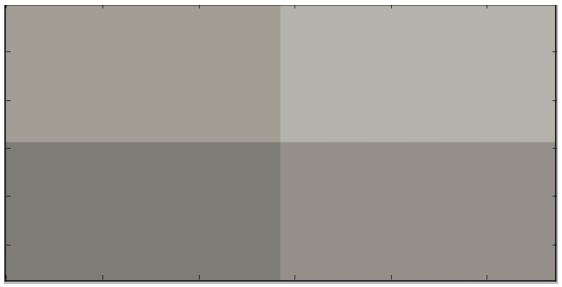
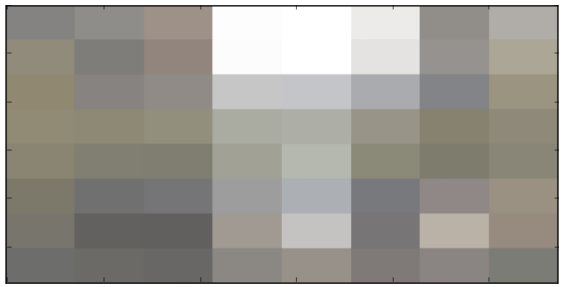
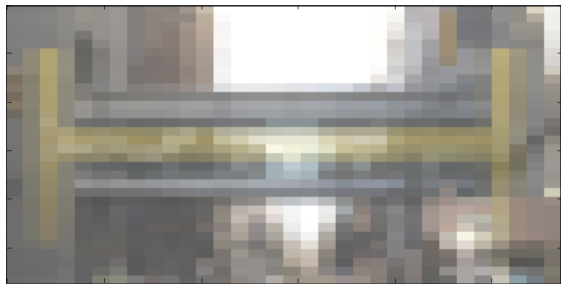

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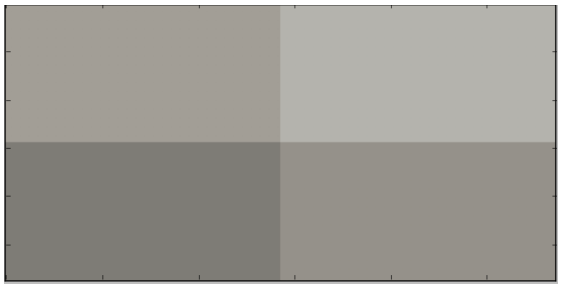
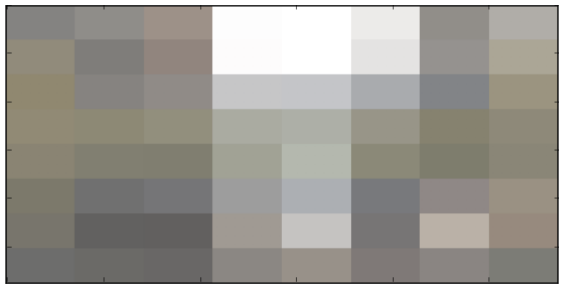
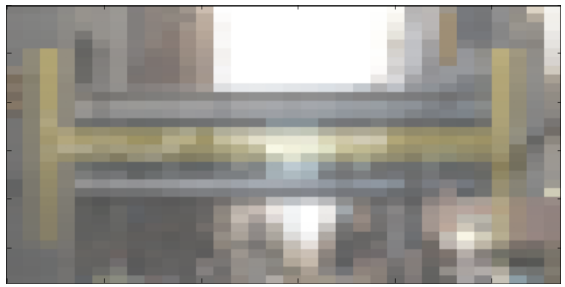

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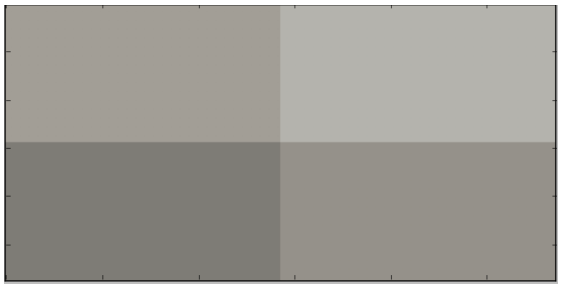
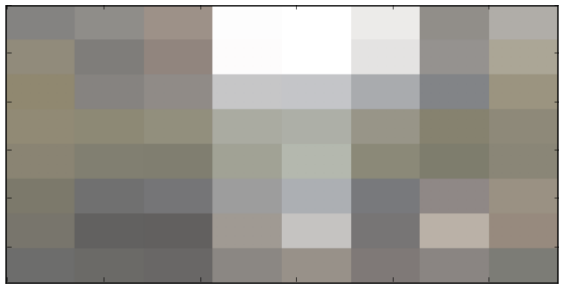
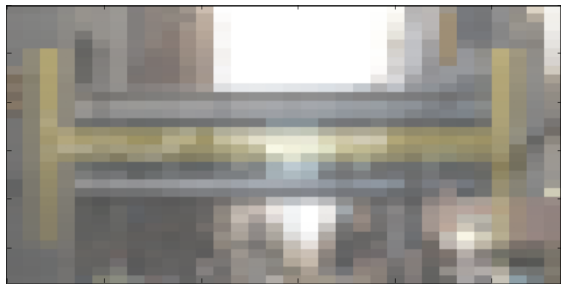

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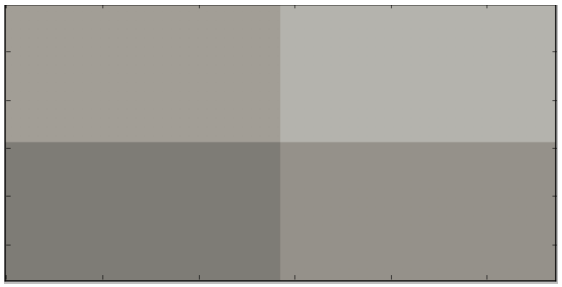
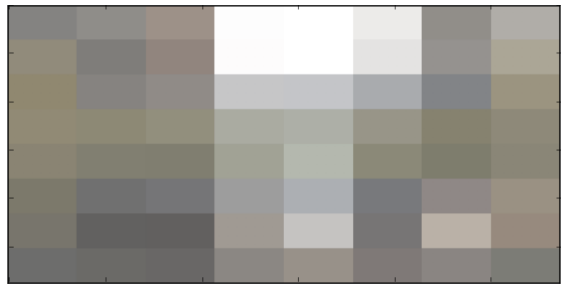


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- Past exams are on the webpage (under Final Exam Information).
- We're starting with Spring 2018, Version 1.

Weekly Reminders!

Before next lecture, don't forget to:

- Work on this week's Online Lab

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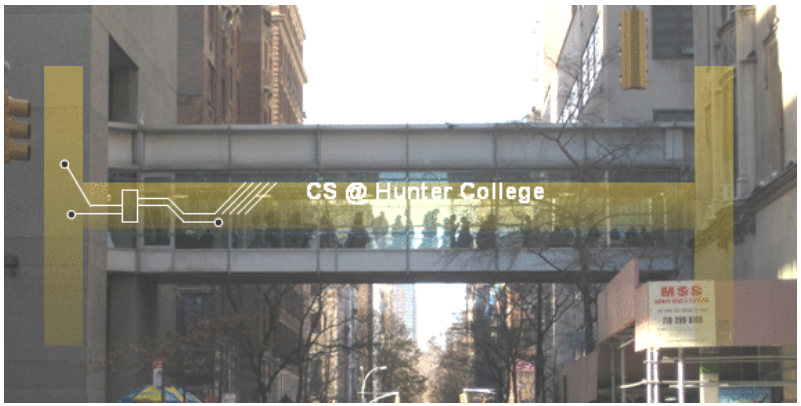

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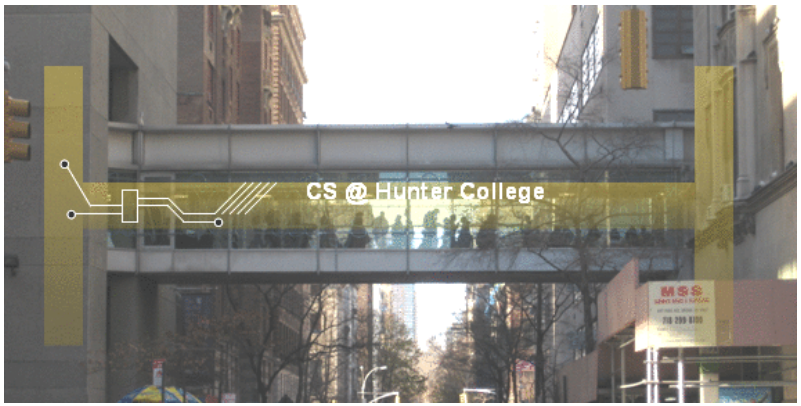

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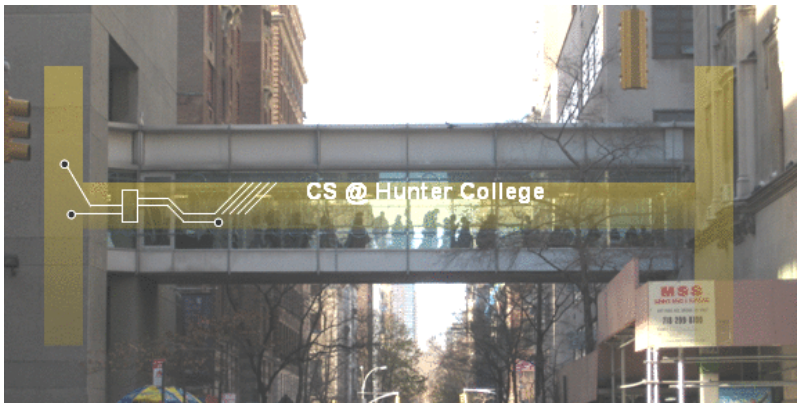

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- Take the Lecture Preview on Blackboard on Monday (or no later than 10am on Tuesday)