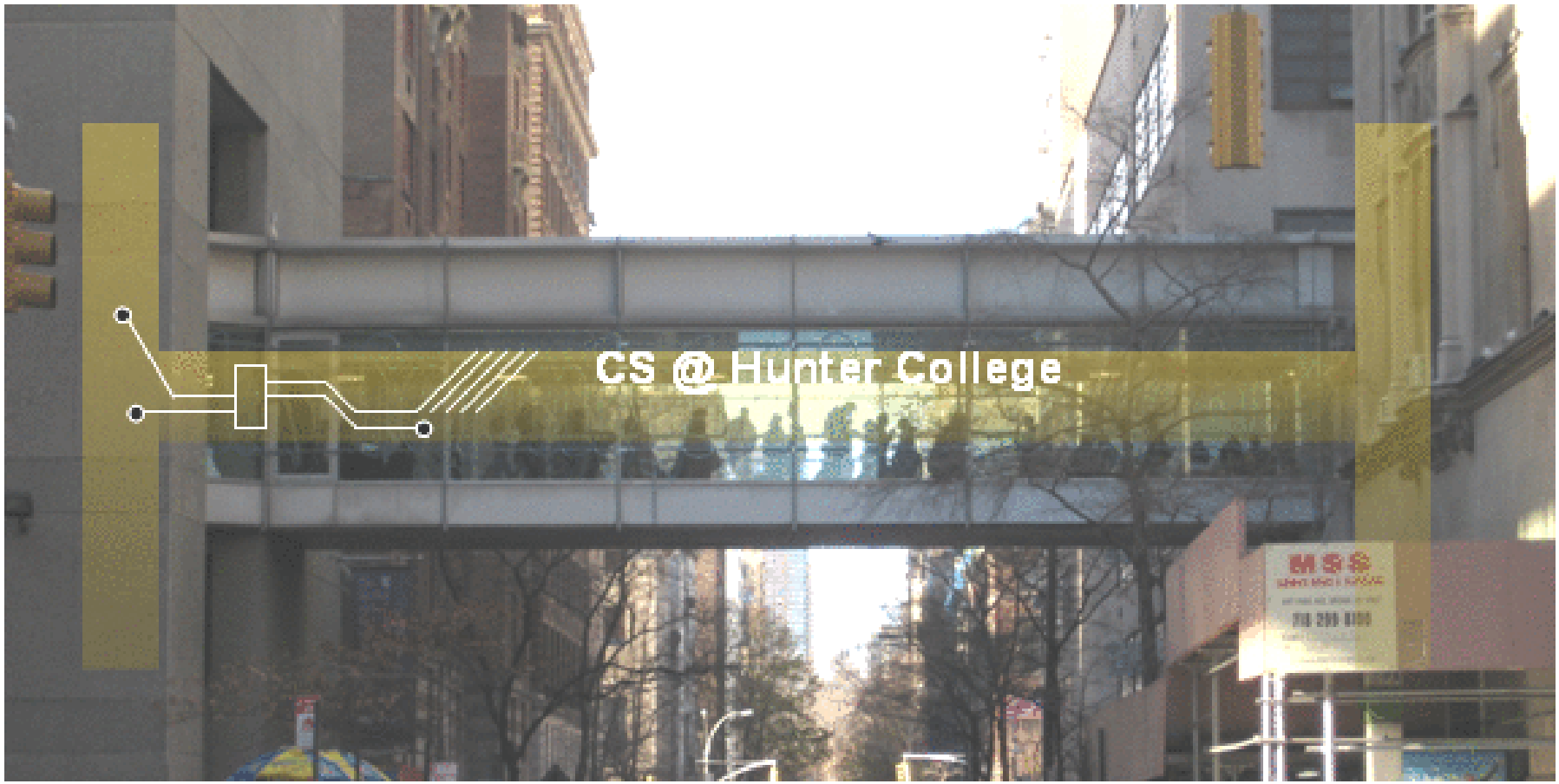
# CSci 127: Introduction to Computer Science




Finished the lecture preview? hunter.cuny.edu/csci

- This lecture will be recorded

# Frequently Asked Questions

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  *Appointments will become available this week, we will announce by email.*

# Today's Topics

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

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- **Recap: Decisions**
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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

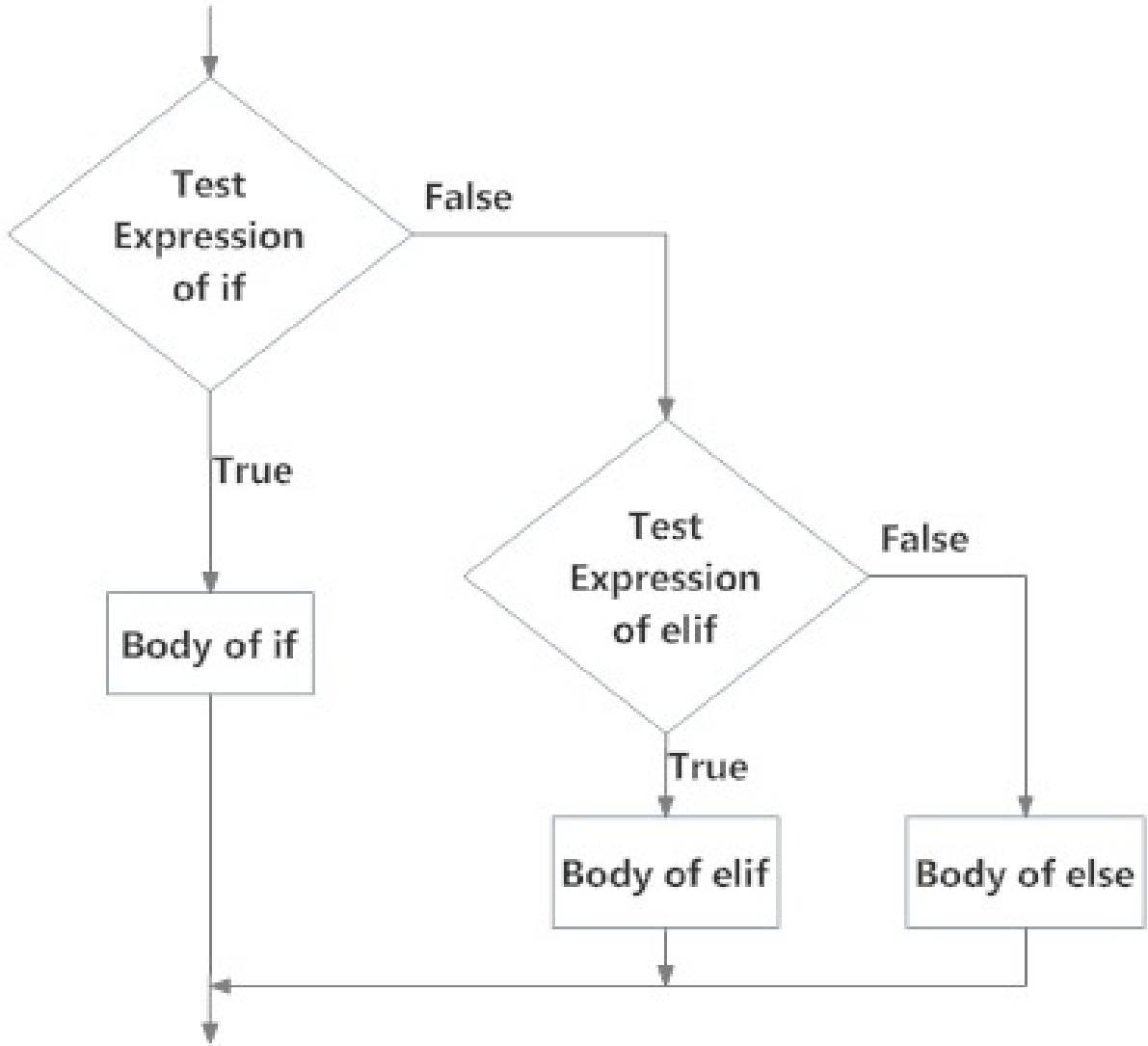
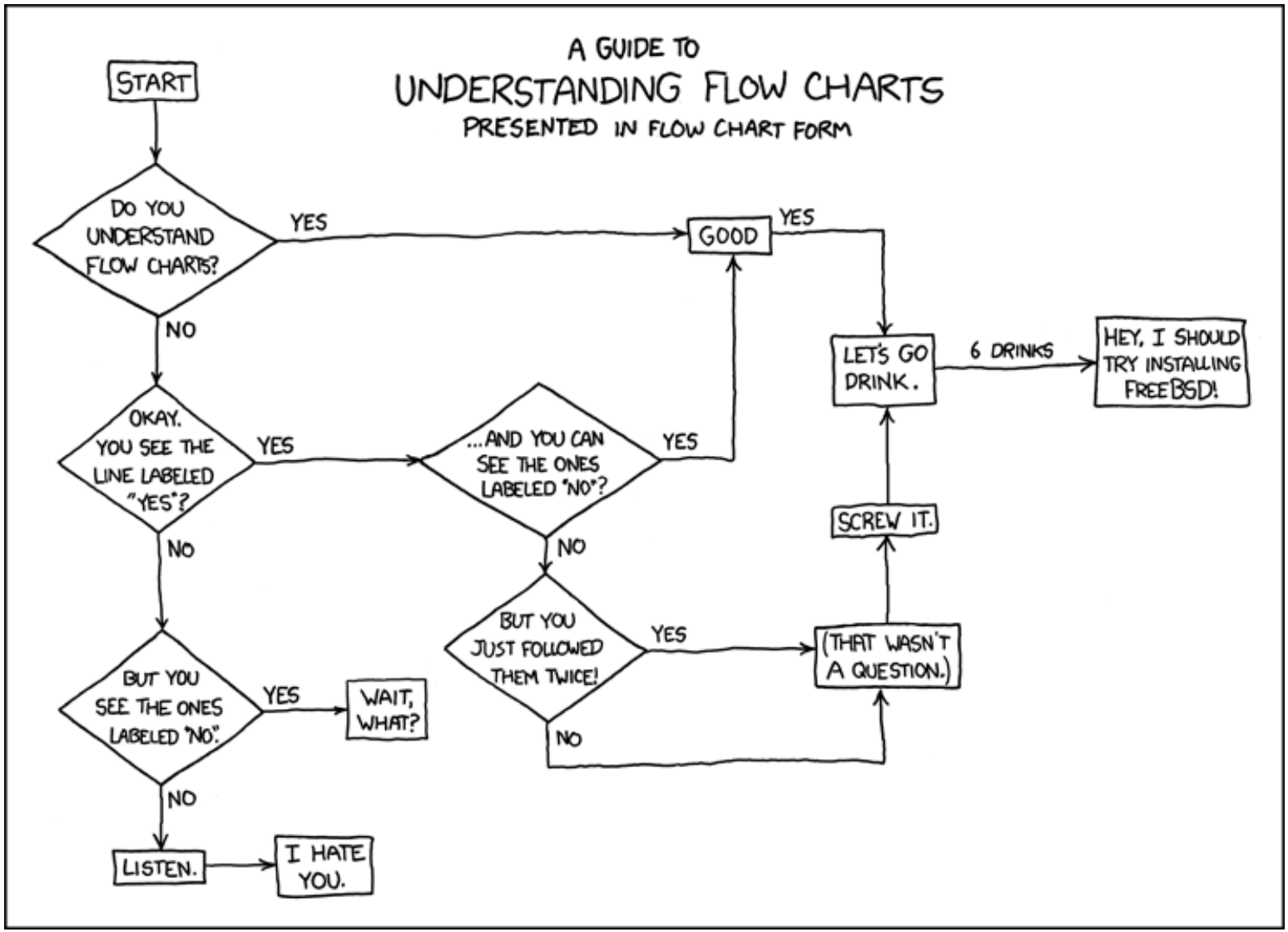



Fig: Operation of if...elif...else statement

(programiz)

# Side Note: Reading Flow Charts




(xkcd/518)

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# 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!")
```

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(Demo with `pythonTutor`)

# Logical Operators

**and**

| in1 | | in2 | *returns:* |
|---|---|---|---|
| `False` | `and` | `False` | `False` |
| `False` | `and` | `True` | `False` |
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**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')
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          print(i)
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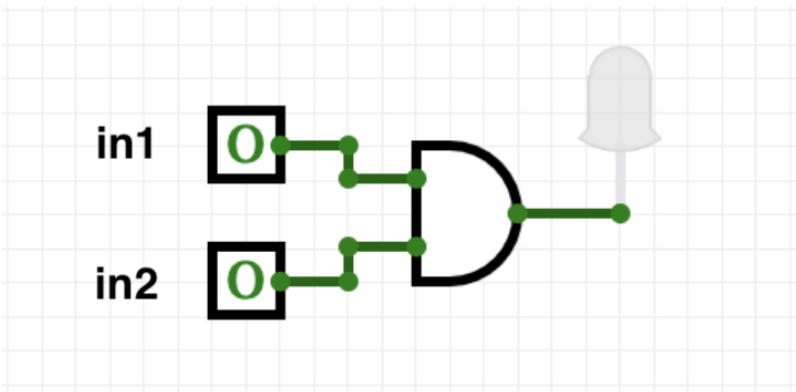
- **Circuits**
- Binary Numbers

# Circuit Demo

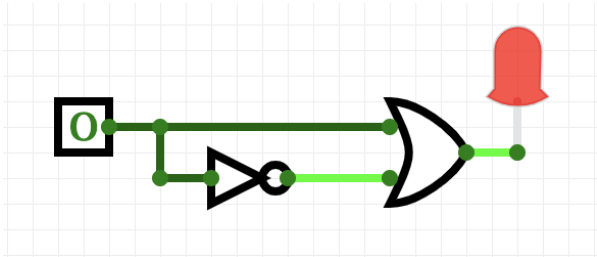



(Demo with `circuitverse`)

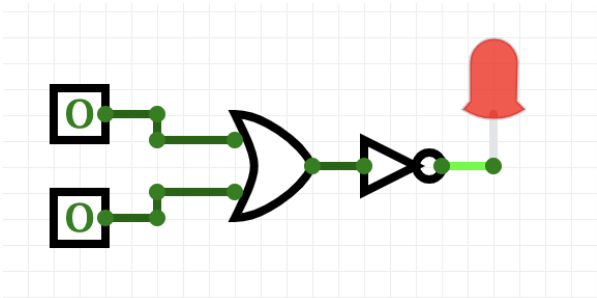
# Challenge

*Predict when these expressions are true:*

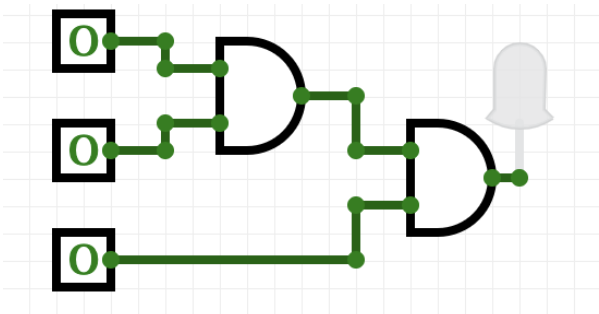
- `in1 or not in1`:



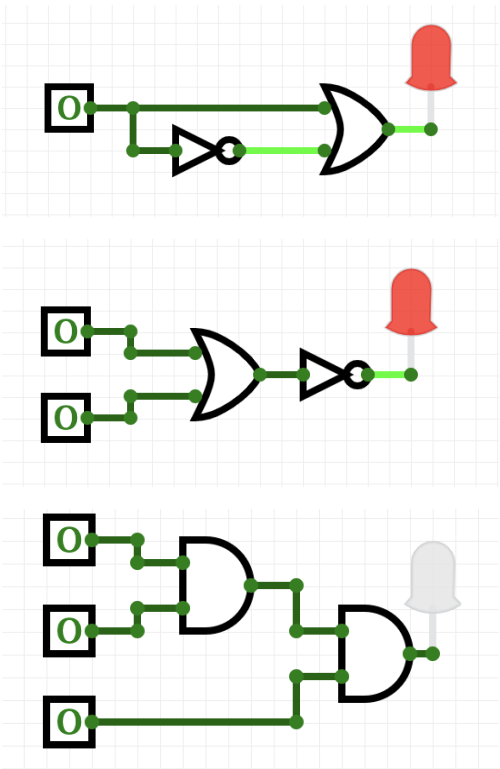
- `not(in1 or in2)`:



- `(in1 and in2) and in3`:



# Circuit Demo



(Demo with `circuitverse`)

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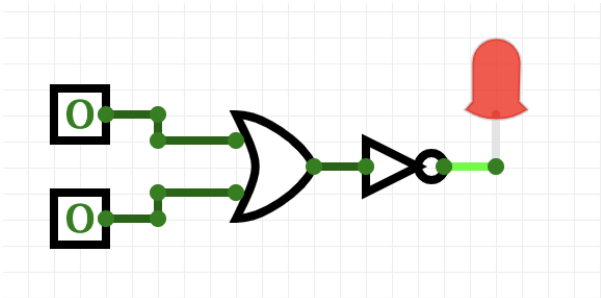
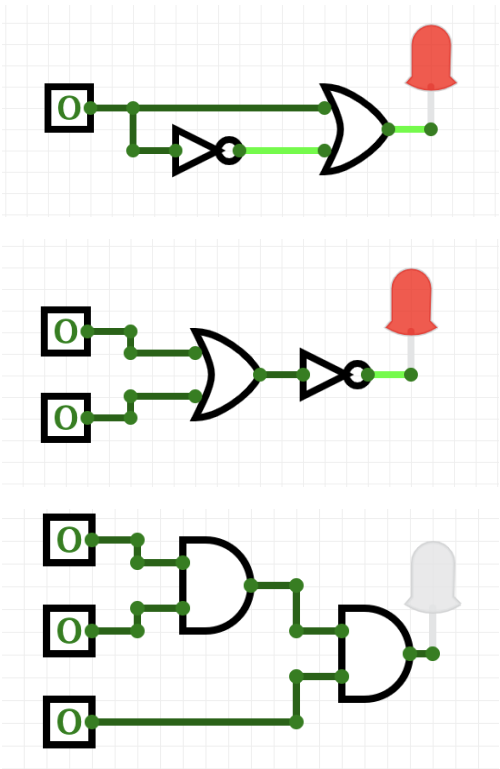



Draw a circuit that corresponds to each logical expression:

- `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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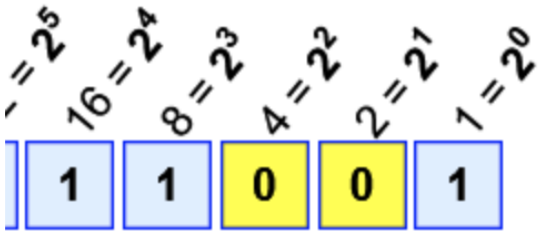
- Computers store numbers using the Binary system (base 2)
- A **bit** (binary digit) being 1 (on) or 0 (off)

# Binary Numbers




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

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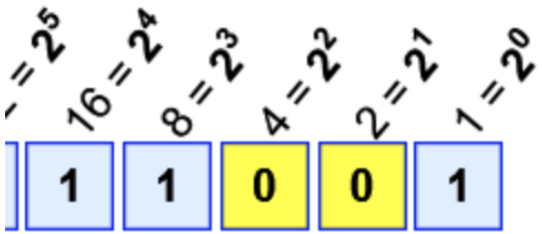


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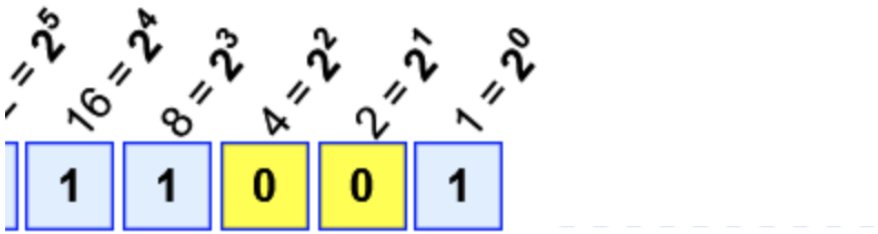


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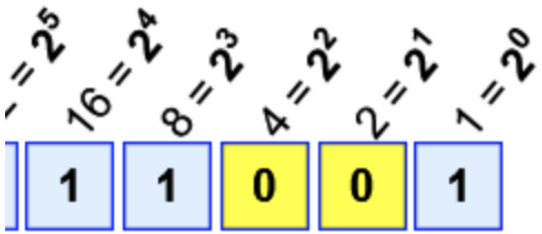


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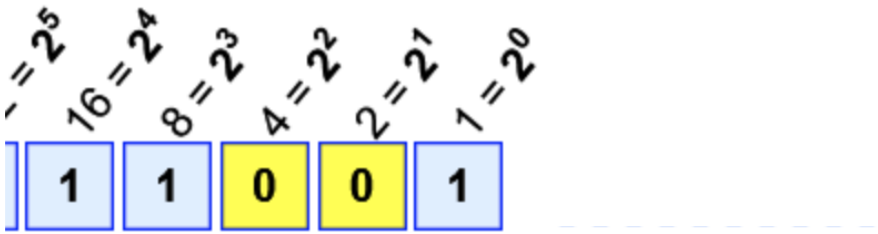


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- In each position the digit is either 0 or 1, so given a binary number we can obtain the decimal equivalent as follows:

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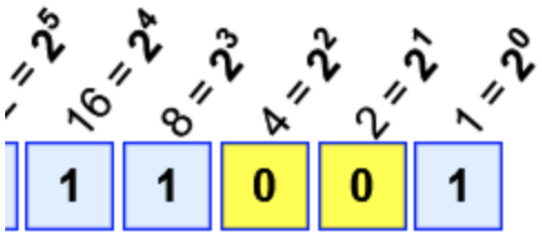


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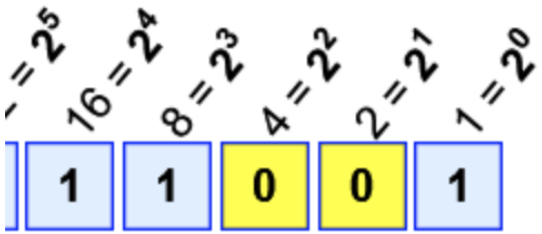


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  - In the "twos" position we either have a 2 or not

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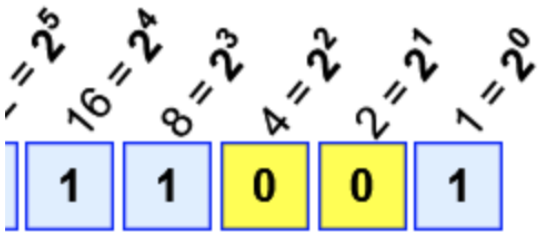


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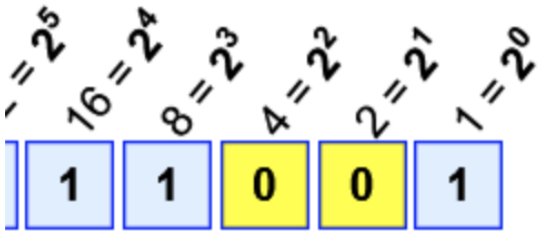
  - Binary: the "ones", "twos", "fours", "sixteens" and so on (powers of 2)
- In each position the digit is either 0 or 1, so given a binary number we can obtain the decimal equivalent as follows:
  - In the "ones" position we either have a 1 or not
  - In the "twos" position we either have a 2 or not
  - In the "fours" position we either have a 4 or not ...

# Binary Numbers




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

- Two digits: **0** and **1**
- Each position is a power of two
  - Decimal: the "ones", "tens", "hundreds" and so on (powers of 10)
  - Binary: the "ones", "twos", "fours", "sixteens" and so on (powers of 2)
- In each position the digit is either 0 or 1, so given a binary number we can obtain the decimal equivalent as follows:
  - In the "ones" position we either have a 1 or not
  - In the "twos" position we either have a 2 or not
  - In the "fours" position we either have a 4 or not ...
- **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".

# 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:

# 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

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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".
- Write down the output to see the pattern:
  1
  2

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

# 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

# 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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  2
  Fizz
  4
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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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  Buzz
  Fizz

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- Write down the output to see the pattern:
  1
  2
  Fizz
  4
  Buzz
  Fizz
  7

# 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
  7
  ...
  14

# 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:
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  2
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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".
- Write down the output to see the pattern:
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  2
  Fizz
  4
  Buzz
  Fizz
  7
  ...
  14
  FizzBuzz
- Write the **algorithm** then, if time, write the code.

# 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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- 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:

# 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.

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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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  - If the number is divisible by 3, print "Fizz".
  - If the number is divisible by 5, print "Buzz".
  - **If divisible by both, print "FizzBuzz".**
  - 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

- 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 (**Reordered**):

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  - Create a loop that goes from 1 to 100.
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- To Do List (**Reordered**):
  - Create a loop that goes from 1 to 100.
  - **If divisible by both 3 and 5, print "FizzBuzz".**
  - If the number is divisible by 3, print "Fizz".
  - If the number is divisible by 5, print "Buzz".
  - Otherwise print the number.
  - Also should print a new line (so each entry is on its own line).

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  - Create a loop that goes from 1 to 100.
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```
for i in range(1,101):
```

# Tech Interview Classic

- To Do List:
  - Create a loop that goes from 1 to 100.
  - If divisible by both 3 and 5, print "FizzBuzz".
  - If the number is divisible by 3, print "Fizz".
  - If the number is divisible by 5, print "Buzz".
  - Otherwise print the number.
  - Also should print a new line (so each entry is on its own line).

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

# Tech Interview Classic

- To Do List:
  - Create a loop that goes from 1 to 100.
  - If divisible by both 3 and 5, print "FizzBuzz".
  - If the number is divisible by 3, print "Fizz".
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  - Otherwise print the number.
  - Also should print a new line (so each entry is on its own line).

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

# Tech Interview Classic

- To Do List:
  - Create a loop that goes from 1 to 100.
  - If divisible by both 3 and 5, print "FizzBuzz".
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for i in range(1,101):
    if i%3 == 0 and i%5 == 0:
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    elif i%3 == 0:
        print("Fizz")
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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")
    elif i%5 == 0:
        print("Buzz")
    else:
        print(i)
```

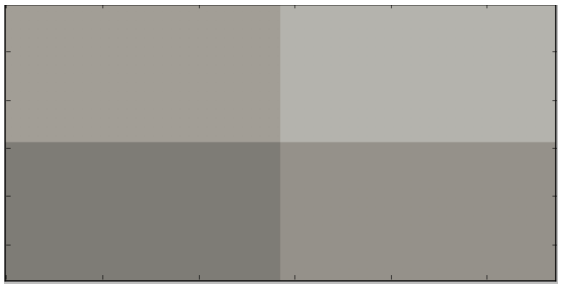
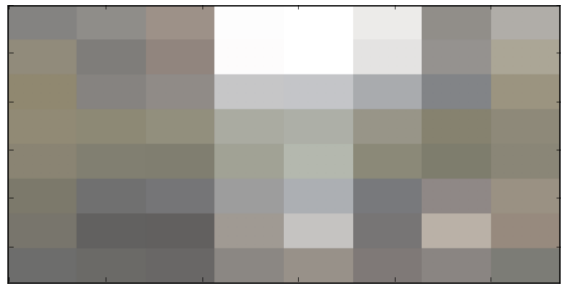
# Recap

- In Python, we introduced:

# Recap

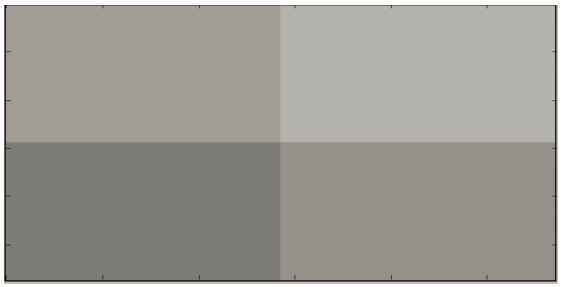
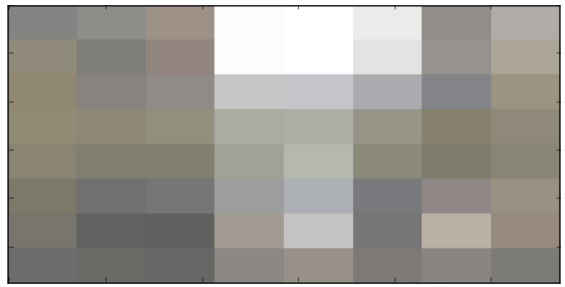
- In Python, we introduced:
  - Decisions
  - Logical Expressions
  - Circuits
  - Binary Numbers

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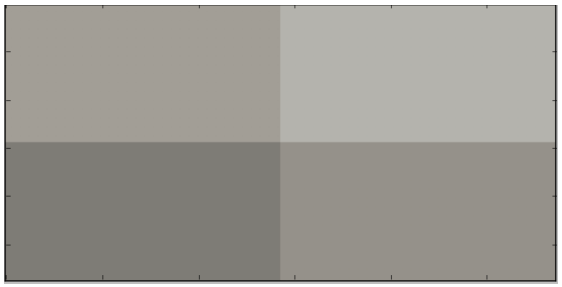
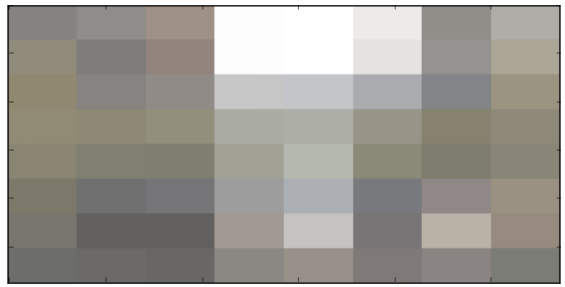
- Pull out something to write on (not to be turned in).

# Practice Quiz & Final Questions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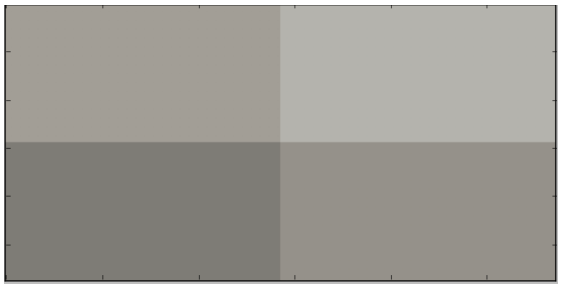
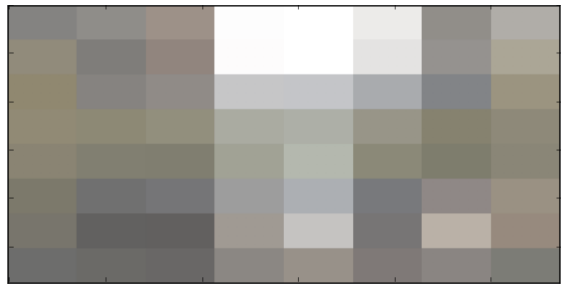
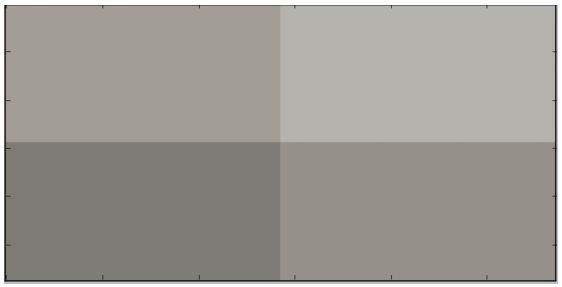
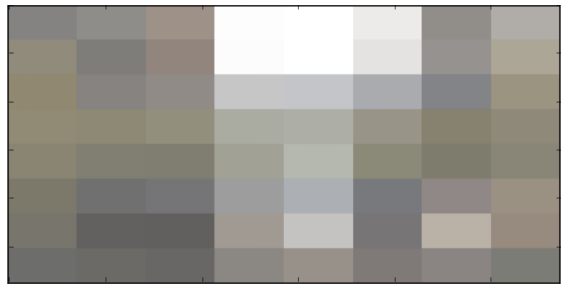
- Lightning rounds:

# Practice Quiz & Final Questions


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

# Practice Quiz & Final Questions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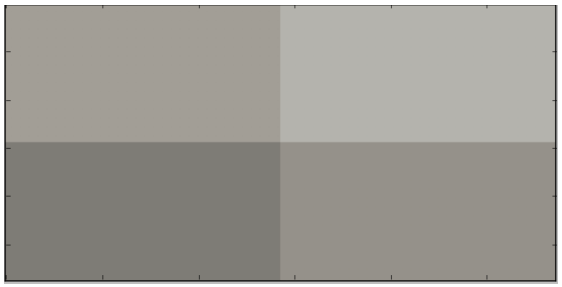
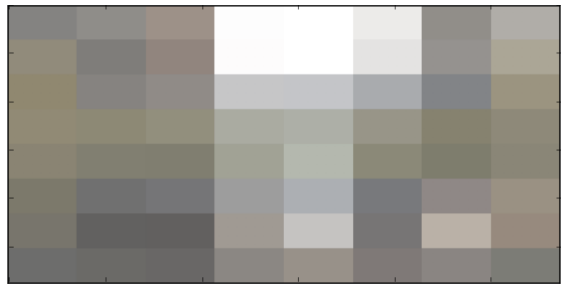
  - followed by answer; and

# Practice Quiz & Final Questions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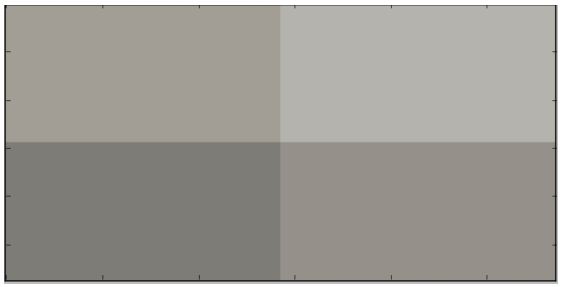
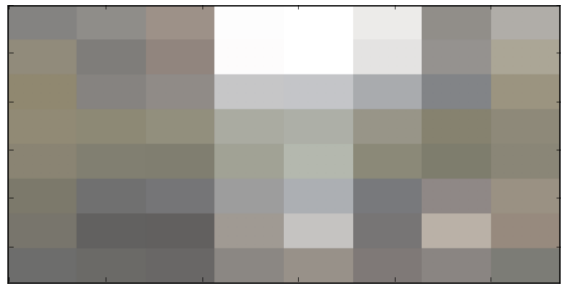


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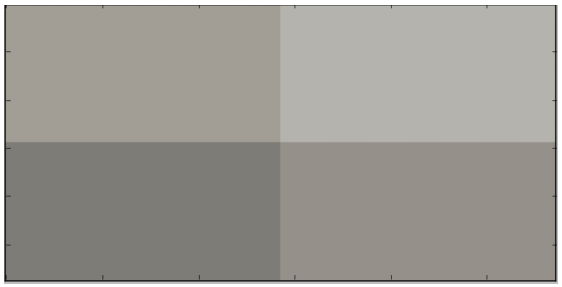
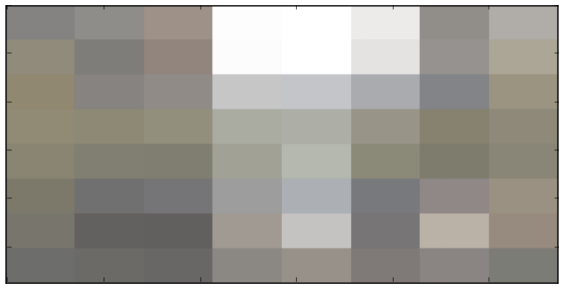
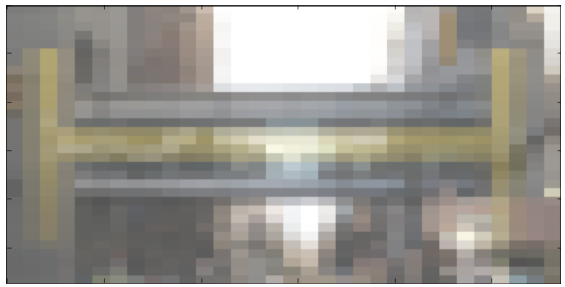

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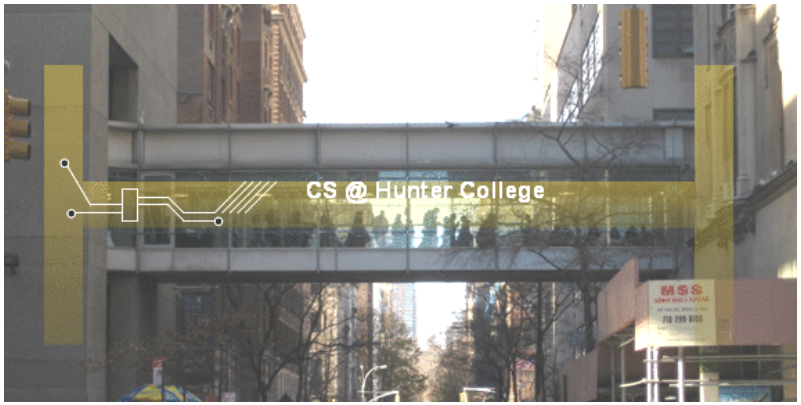
- We're starting with Spring 2018, Version 1.

# Weekly Reminders!




Before next lecture, don't forget to:

- Work on this week's Online Lab

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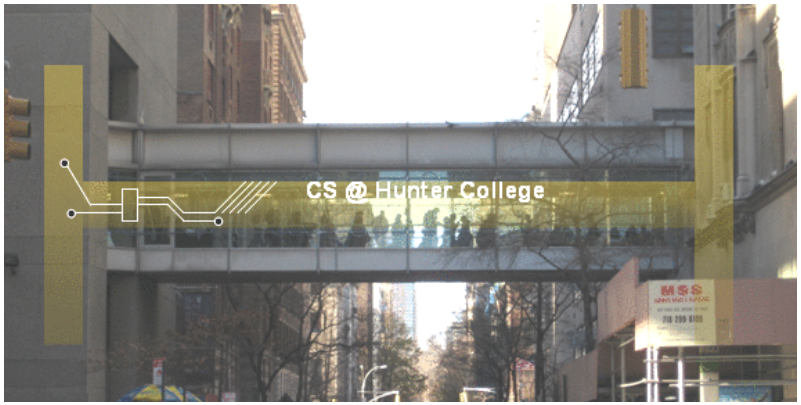


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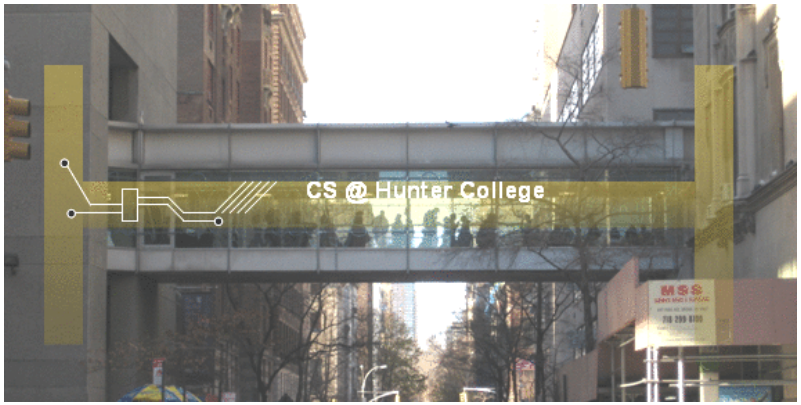


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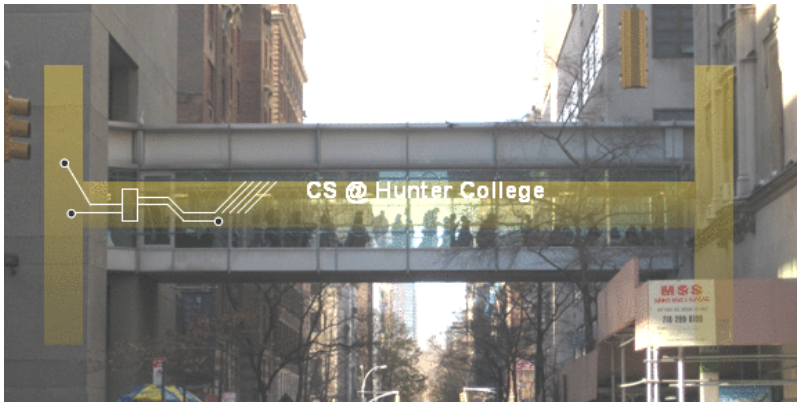


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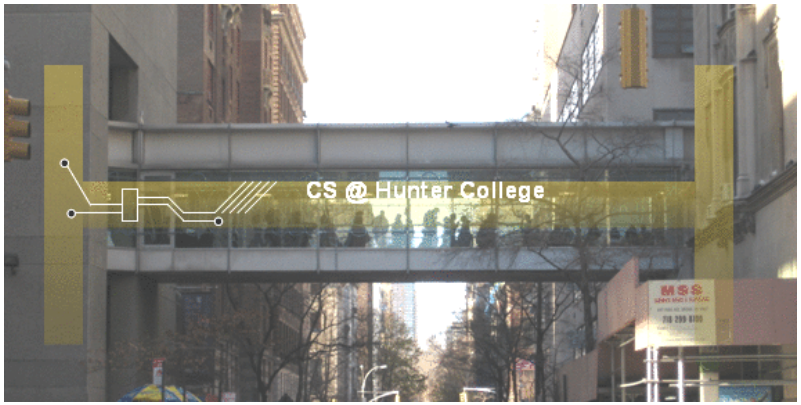
- Submit this week's 5 programming assignments (programs 21-25)

# Weekly Reminders!

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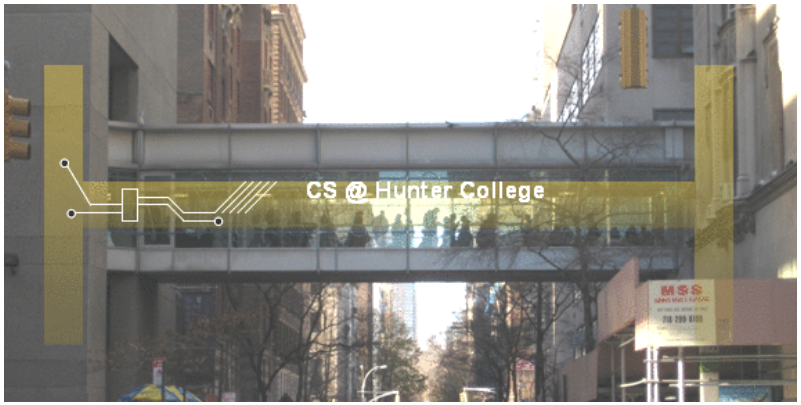


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