• Questions/Announcements

• Python conditionals, cont’d

• Repetition (Looping) in Python

Days of programming can save you hours of planning.
Be Careful

```python
>>> x = 108
>>> y = 1008
>>> z = 0
>>> (x < y) or (x/z < y)
>>> (x > y) or (x/z < y)
```
def splitCandy(candy):
    
    if candy == "skittles":
        cctr = 24
    elif candy == "m_and_m's":
        cctr = 31
    elif candy == "gummy_worms":
        cctr = 15
    else:
        print( "Sorry, don’t know that candy.”)

    if (cctr % 2) == 0:
        print ("Each child gets the same number.”)
    else:
        print( "There is one extra piece of candy.”)

    return #None
def splitCandy(candy):
    """
    """
    if candy == "skittles":
        cctr = 24
    elif candy == "m_and_m's":
        cctr = 31
    elif candy == "gummy_worms":
        cctr = 15
    else:
        cctr = 0

    result = isEven(cctr)
    if result == True:
        print('This should work."
    else:
        print('This might be tricky."

    return #None

def isEven(n):
    return (n % 2) == 0
def splitCandy(candy):
    if candy == "skittles":
        cctr = 24
    elif candy == "m_and_m's":
        cctr = 31
    elif candy == "gummy_worms":
        cctr = 15
    else:
        cctr = 0

    if cctr == 0:
        print('Sorry, no candy."
    else:
        if isEven(cctr):
            print('This should work."
        else:
            print('This might be tricky."

    return #None
Calculate the growth of a savings account using a simple growth model:

\[ S_{t+1} = S_t + rS_t \]

where \( S_t \) is the savings amount at time \( t \), and \( r \) is the growth rate.

How long does it take to double the original savings?
def savings_calc(amount, rate):
    '''(number, number) -> int    '''
    t = 0

    # new amount saved (savings at time t + 1) is the current
    # savings + the rate of growth applied to current savings
    amount = amount + (rate * amount)

    t += 1

    if amount >= (2 * amount):  # has savings doubled?
        return t                 # yes – return how long it took
    else:
        ??
def savings_calc(amount, rate):
    """(number, number) -> int ""
    t = 0
    
    # new amount saved (savings at time t + 1) is the current
    # savings + the rate of growth applied to current savings

    while amount < (2 * amount):
        amount = amount + (rate * amount)
        t += 1

    return t
while <boolean expression>:
  <block of code>
while <boolean expression>:
  <block of code>

• While loop (indefinite loop)
  – Runs while a condition is True
  – Most general kind of loop
while <boolean expression>:
    <block of code>

as long as the boolean expression evaluates to True, execute the code in the block of code
• Questions/Announcements

• Repetition (Looping) in Python

Computers are good at following instructions, but not at reading your mind.

~ Donald Knuth
What is the value of x after the following Python code is executed?

```python
x = 3
while (x < 10):
    x = x + 10
```

a) 3  
b) infinite loop  
c) 13  
d) None
def savings_calc(amount, rate):
    '''(number, number) -> int  '''
    t = 0

    # new amount saved (savings at time t + 1) is the current
    # savings + the rate of growth applied to current savings
    while amount < (2 * amount):
        amount = amount + (rate * amount)
        t += 1

    return t
def savings_calc(amount, rate):
    '''(number, number) -> int
    t = 0
    start_amount = amount

    # new amount saved (savings at time t + 1) is the current
    # savings + the rate of growth applied to current savings

    while amount < (2 * start_amount):
        amount = amount + (rate * amount)
        t += 1

    return t
Check list for indefinite loops
1. Set up the loop end condition
2. Initialize the loop variable (outside of the loop)
3. Write the body of the loop
4. Advance the counter variable
5. What to do when the loop is done?
Vowel finder: Write a function, `find_vowels`, that takes one input parameter of type string, and creates a string of the vowels ('a', 'e', 'i', 'o', 'u') that appear in the input string. For example,

```python
>>> find_vowels('The quick brown fox')
'euioo'
```
what is output – print and/or return? type?
what is input – how? type?
function description?
examples?
what is output – print and/or return? type?
what is input – how? type?
function description?
examples?

algorithm will repeat (loop):
  1) when to stop?  2) initialize the loop ctr
  3) body of the loop?
  4) advance the loop counter
  5) what happens when the loop is done?
def vowel_finder(astring):
    """(str) -> str

>>> vowel_finder('The quick brown fox')
'eui00'
''

while ctr < len(astring):
    if astring[ctr] in 'aeiou':
        print(astring[ctr])

    ctr += 1

return #None
def vowel_finder(astring):
    '''(str) -> integer

    >>> vowel_finder('The quick brown fox')
    'euioo'
    '''

    vowels = 'aeiou'
    vowelstring = ''
    ctr = 0

    while ctr < len(astring):
        nextchar = astring[ctr]
        if nextchar in vowels:
            vowelstring += nextchar
        ctr += 1

    return vowelstring
A Python for statement provides looping for sequences:

```
for <var> in <sequence>:
    <body>
```

Note that this is a special case of a while loop.
vowels = 'aeiou'
vowelstring = ''
ctr = 0

while ctr < len(astring):
    nextchar = astring[ctr]
    if nextchar in vowels:
        vowelstring += nextchar

    ctr += 1

for nextchar in astring:
    if nextchar in vowels:
        vowelstring += nextchar
What is the result when the following code is executed?

def any_upper(astring):
    '''
    '''
    for ch in astring:
        if ch.isupper():
            return True
        else
            return False

>>> any_upper('CIS122')
>>> any_upper('122CIS')