Name _____

CPADS Reading Activity I
Due: Monday, 9-28-2015

For each program, sketch what output you think the above program will produce. For references, the turtle graphics library functions are defined below.

> fd(t, *length*) − moves turtle t forward *length* units
> bk(t, *length*) − moves turtle t backward *length* units
> lt(t, *angle*) − turns turtle t *angle* degrees to the left
> rt(t, *angle*) − turns turtle t *angle* degrees to the right
> pd(t) − starts drawing for turtle t (pen down)
> pu(t) − stops drawing for turtle t (pen up)

Program #1

```
# Load TurtleWorld functions
from TurtleWorld import *

def doSomething(t, height):
    pu(t)
    bk(t, height/4)
    lt(t, 90)
    bk(t, height/2)

    pd(t)
    fd(t, height)
    rt(t, 90)
    fd(t, height/2)
    rt(t, 90)
    fd(t, height)

    pu(t)
    bk(t, height/2)
    rt(t, 90)

    pd(t)
    fd(t, height/2)


def main():
    # Create TurtleWorld and Turtle objects
    world = TurtleWorld()
    turtle = Turtle()

    height = 50
    doSomething(turtle, (3*height)/5)


main()
```

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Assuming the turtle begins in the center of the screen, sketch what output you think the above program will produce?

Program #2

```
def doSomething(val1, val2, val3):
    return val1 + val2 + val3

def doSomethingElse(val1, val2):
    return val1 / val2


def main():
    # Define variables
    num1 = 100
    num2 = 200
    num3 = 300

    # Do computation
    result1 = doSomething(num1, num2, num3)
    result2 = doSomethingElse(result1, 3)

    # Print output
    print(result2)

main()
```

In English, describe what the program above does. What value does the print statement output?

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Program #3

Starting with the given square and row functions, extend the row function so that you can use it to create a **pyramid** function the draws rows that contain blocks (squares) with sizes relative to the number of blocks in each row. For example: for a row of length 2, the blocks in the row would have size 2, for a row of length 3, the blocks in the row would have size 3. Draw the pyramid so that it is centered *across* the width of the Turtle World drawing space.

Instead of the "repeat" instruction (which does not exist in Python), you can use the 'while' construct shown in the two functions. For your 'repeat' instruction for the **pyramid**, you will need to surround the code you want to repeat with the following **while** loop construct – see the examples below in the **square** and **row** functions. We will go over loops in detail in a later lecture.

```
                          # x is the # of squares in the base row of
    i = x                 # the pyramid, passed into the pyramid
                          # function you are to write

    while i > 0:
        *** insert your repeated code here ***
        i = i - 1         # i decrements each 'repeat', and the while
                          # loop stops repeating when i reaches 0
```

*NOTE: Pay attention to the indentation in the following functions for the **while** instruction – anything that needs repeated, needs to be indented under the **while** instruction.*

```
# Function to have turtle 't' draw a square of size 'size' CCW
def square(t,size):
    pd(t)                 # put pen down
    i = 4                 # 'repeat' value
    while i > 0:          # repeats while i > 0
        fd(t,size)        # draw a side of length x
        lt(t,90)          # turn 90 degrees CCW
        i = i - 1         # decrement 'repeat' value
    pu(t)                 # pick pen up


# Function to have turtle 't' draw a row of 'numBlocks' blocks
#(squares) # of a fixed size (20)
def row(t, numBlocks):
    i = numBlocks         # 'repeat' value
    while i > 0:          # repeats while i > 0
        square(t,20)      # draw square of size 20
        fd(t,20)          # move forward to next square
        i = i - 1         # decrement 'repeat' value
    bk(t,numBlocks*20)    # move back to original start
```
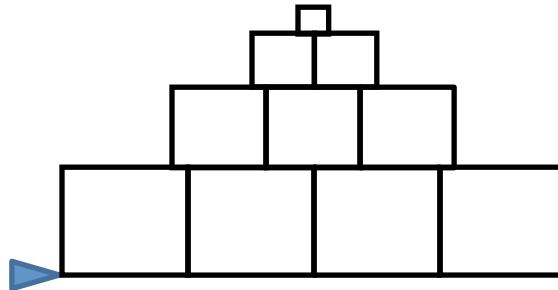
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For example, a call to **pyramid(t,4)** would result in the following pyramid being drawn:

You are NOT required to run the Python code, but rather just write your suggested code below. We will discuss your various solutions in class Monday, and then do the coding portion of the exercise.

Updated row function:

Pyramid function:
Hints: To position the cursor for the next row, try either of these approaches
1) *Move the cursor up the size of the row just drawn, and then forward half the difference in length between the last row and the next row to be drawn.*
2) *Move the cursor to the center of the current row, up the height of the current row, and backwards half the length of the next row to be drawn.*