Name:_____   Section:____   Andrew Id: _____

15-112 Spring 2017 Quiz 6a
* Up to 30 minutes. No calculators, no notes, no books, no computers. * Show your work! * No recursion

1. **Code Tracing** [10 pts]:Indicate what these print or (for graphics) draw. Place your answers (and nothing else) in the boxes below the code.

```
def ct1(L):
    a = copy.copy(L)
    b = copy.deepcopy(L)
    c = L
    a[0][0] += 1
    b[1][0] += 10
    c[2][0] += 100
    L.extend(b)
    return [M[0] for M in L]
# Be careful to get the brackets
# and commas right!
L = [1]
M = [L, L, copy.copy(L)]
print(ct1(M))
```

2. **Reasoning Over Code** [10 pts]:
   Find an argument for the following function that makes it return True. Place your answers (and nothing else) in the boxes below the code:

```
def rc1(L):
    n = len(L)
    M = [ ]
    for i in range(n):
        M.append(list(range(L[i], L[i]+n)))
    diagonal = [M[i][-1-i] for i in range(len(M))]
    return (diagonal == [3, 8, 2, 5])
```

L =

3. **Free Response #2: animatedLines** [80 pts]
   Using our animation framework and assuming run() is already written, write init(data), keyPressed(event, data), mousePressed(event, data), timerFired(Event), and redrawAll(canvas, data) so the app works as such:

   1) The canvas is empty when the app launches except for a status message at the bottom center, which says "hello".
   2) When the user clicks at (x,y):
      a) the status message displays where the mouse click occurred.
      b) a horizontal line animates, growing from left-to-right across the screen at the y height of that click.
      c) the fully-drawn lines are numbered in the order they were drawn, with that number horizontally centered on each line.
      d) while the line is animating, if the user presses a key, the status message is 'ignored keyPress', and if the user clicks the mouse, the status message is 'ignored mousePress'
   3) Each time the user presses 'u' while not animating...
      a) The most-recently drawn line is "undone", so it is not drawn.
      b) If there is no such line, the status message is 'ignored undo'
   4) Each time the user presses 'r' while not animating...
      a) The most-recently undone line is "redone", so it is drawn again.
      b) If there is no such line, the status message is 'ignored redo'
      c) Note: if a new line is placed with a mouse click, then the redo list is cleared, so pressing 'r' immediately after a mouse click always results in 'ignored redo'.

   Note: we will show a short demonstration of this app at the start of the quiz (without the quiz clock running).

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4. **Bonus/Optional: Code Tracing** [5 pts] Indicate what these print. Clearly circle your answers.


```
def bonusCt1(n):
    return [n]*n if (n**n == n//n) else [n]+bonusCt1(len(str(2**n)))
print(bonusCt1(int('100',base=8)))
```


```
def bonusCt2(n):
    return [ ] if (n<=2) else [n]+bonusCt2(n//5)+bonusCt2(n//10)
print(bonusCt2(250))
```