Name:_____   Section:____   Andrew Id: _____   a

15-112 Fall 2019 Quiz 7a
* Up to 20 minutes. No calculators, no notes, no books, no computers. * Show your work!
* No recursion

1. Short answers: [20 pts]

SA1. Fill in each blank with Model, View, or Controller:

A) The _____ draws the app using the values in the model.

B) The _____ contains all the data we need for the animation.

C) The _____ responds to keyboard, mouse, timer and other events
   and updates the model.

SA2. Fill in the blank with the correct answer:

A) If we set app.timerDelay to 100, then we will get roughly _____
calls to timerFired per second.

B) If we _____ app.timerDelay, the animation will appear to speed up.

C) In our grid example, getCellBounds is also known as _____,
because it takes row,col values and converts them to (x,y) values.

**SA3. Fill in the two blanks (one line each) with the missing code from the takeStep function
from our Snake example in the notes:**

```
def takeStep(app):
    (drow, dcol) = app.direction
    (headRow, headCol) = app.snake[0]
    (newRow, newCol) = (headRow+drow, headCol+dcol)
    if ((newRow < 0) or (newRow >= app.rows) or
        (newCol < 0) or (newCol >= app.cols) or
        ((newRow, newCol) in app.snake)):
        app.gameOver = True
    else:


        _____# <-- Fill in
        if (app.foodPosition == (newRow, newCol)):
            placeFood(app)
        else:


        _____# <-- Fill in
```

2. Free Response: Circle Animation [40 pts]

Write an animation with the following features:

- A **circle** with radius 20 begins at the center of the canvas.
- A **score** (which starts at 0) is drawn near the center-bottom of the screen
- **Clicking** anywhere above the circle center moves it 50 pixels up
- Pressing the **right arrow key** moves the circle 50 pixels to the right
- If any part of the **circle** extends beyond the canvas, add one to the score and re-center the circle
- After **20 seconds**, the score re-sets to 0 and the circle is re-centered.

To receive credit, you must **follow all MVC conventions!** You must also **write all helper functions.**

3. Free Response: Grid Animation [40 pts]

Write an animation with the following features:

- A square canvas (**width == height**)
- A 5x9 (5 rows 9 cols) **grid** of cells, centered, with no margin
  - The default fill for each cell is blue
  - The top left cell is initially highlighted (filled) yellow.
- Pressing the **arrow keys** appropriately changes which cell is highlighted.
  - If there is no cell in that direction, the current cell remains yellow
  - Otherwise, the current cell becomes blue again, and the cell in the direction of the arrow becomes highlighted

To receive credit, you must **follow all MVC conventions!** You must also **write all helper functions.**

4. **Bonus/Optional: Code Tracing** [2 pts]
   Indicate what this prints. Very clearly circle your answer (and nothing else):

```
def bonusCt1(L,n):
    for i in range(n):
        temp = [[0] * len(L) for i in range(len(L[0]))]
        for a in range(len(L)):
            for b in range(len(L[0])):
                c = len(L[0]) - b - 1
                temp[b][a] = L[a][c]
        L = temp
    return L

L=[[1, 2, 3], ['a','b','c'], [4, 5, 6]]
print(ct1(L,5))
```