fullName: _____ andrewID: _____ section: ____

15-112 S26 Quiz6 Version 2B
Time: 20 Minutes

You must write your name on this paper and hand this back in immediately after the assessment. If we do not receive it immediately, you will receive a zero on the assessment. Do not unstaple any pages. All pages must be handed in intact.

Do not use your own scrap paper. You should not need it, but if you must absolutely have scrap paper, raise your hand and we will provide some. Write your andrewID clearly on it and hand it in with your quiz. We will not grade anything on scrap paper.

You may not ask questions during the quiz, except for English-language clarification questions. If you are unsure about a problem, take your best guess.

Before and during the quiz, you may not view any other notes, prior work, websites or resources, including any form of AI. You may not use calculators, phones, laptops, or any other devices. You may not communicate with anyone else except for current 112 TAs or faculty during the assessment. All syllabus policies apply.

You may not discuss this test with anyone else, even briefly, in any form, until we have released grades. Failure to abide by these rules may result in an academic integrity violation.

Do not use material we have not yet covered. Thus, do not use sets, dictionaries, OOP, or recursion.

Do not open this or look inside (even briefly) before you are ready to begin. Do not spend more than the specified time noted above on this assessment.

Note:

1. Before you start this quiz, you will be shown a short video of the animation you will write. The writeup also includes a step-by-step explanation of the animation.

2. You may assume the window is square (same width as height), and you may assume the width is at least 100, but you may not assume any specific value for the width.

3. You may not assume that app.stepsPerSecond has any specific value, and you may not change app.stepsPerSecond.

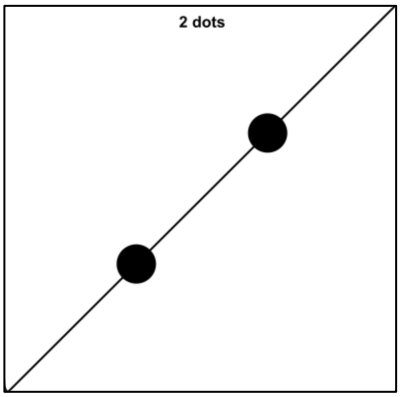
4. Make reasonable assumptions about any unstated values (such as font sizes).

FR: Dots on Line [100 pts]

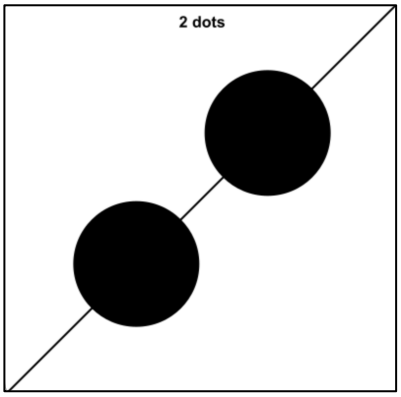
Write an animation where:

At the start, the app looks like the screenshot to the right. Note:

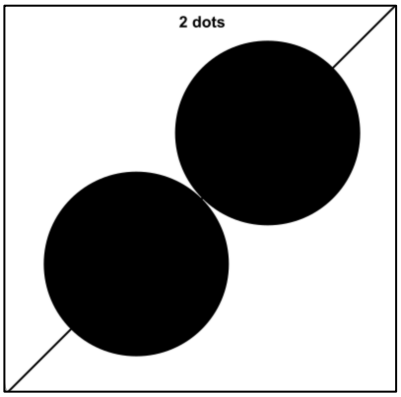
- The label ("2 dots") is centered horizontally at y=20.
- A line runs from the bottom-left corner to the top-right corner.
- Two dots, each of radius 20, lie on the line, equally spaced from each other and from the ends of the line.



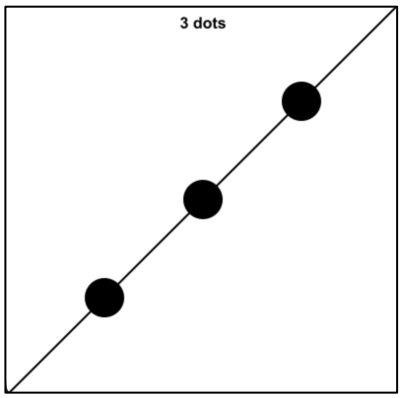
The dot radiuses each increase by 1 on each call to onStep. So after 30 calls we get:



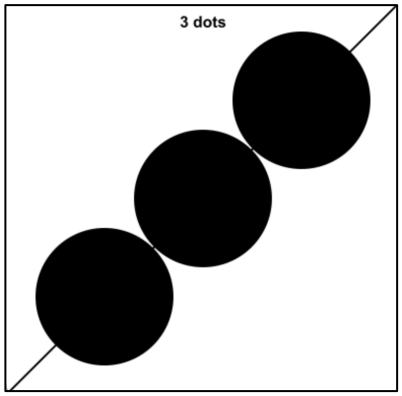
Soon after that, the two dots nearly intersect, like so:



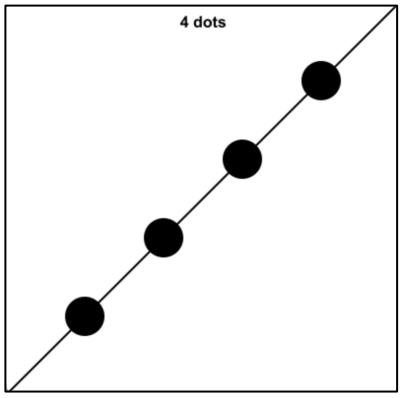
When the 2 dots would intersect, instead they are replaced with 3 dots, each of radius 20, each equally spaced from each other and from the ends of the line. Also, the label updates to “3 dots”.



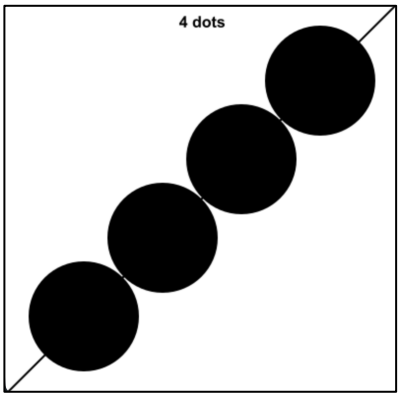
The radiuses continue to grow by 1 on each call to onStep until the 3 dots almost intersect like so:



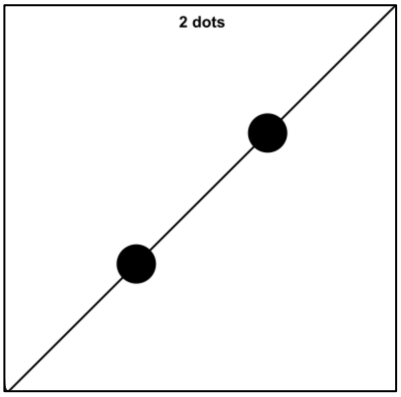
When the 3 dots would intersect, instead they are replaced with 4 dots, each of radius 20, each equally spaced from each other and from the ends of the line.



The radiuses continue to grow by 1 on each call to onStep until the 4 dots almost intersect like so:



When the 4 dots would intersect, instead the animation repeats forever, so on the next call to onStep we are back to where we started, after which all the steps above repeat forever.



Write your solution on the next page.

BonusGraphicsCT [2 pts]

This Graphics CT is optional, and intended to be very challenging. It is worth very few points. Sketch what the following code draws. Place your answer (and nothing else) in the box below the code block, which represents the entire canvas. Note that the code does not crash.

```
from cmu_graphics import *
import math

def redrawAll(app):
    s = app.width
    for x in range(s//2):
        y = (s**2//4 - x**2)**0.5
        drawLine(x, 0, x, y)
        drawLine(s-x, s, s-x, s-y)
        y = 20 + 20 * math.sin(4*math.pi*x/s)
        drawCircle(x, s-y, 2)
        drawCircle(x+s//2, y, 2)

runApp()
```