01219116/117 Computer Programming II
Midterm Examination

Part 2: GUI Programming
March 4, 2021

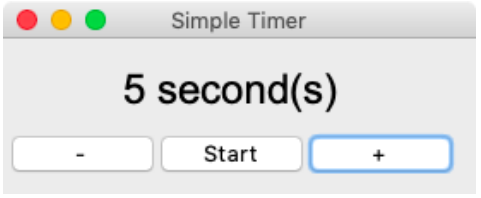
Tasks to do

1. [100] The code `simple-timer-stub.py` provides a stub for a simple timer application.

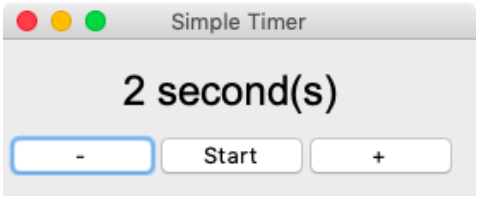
Copy the code to `simple-timer.py` and modify the code so that it works as follows:

a. [20] When the **+** button or the **-** is clicked, the remaining time increases or decreases by 1 second, respectively, as shown.

After clicking the **+** button five times



After clicking the **-** button three times



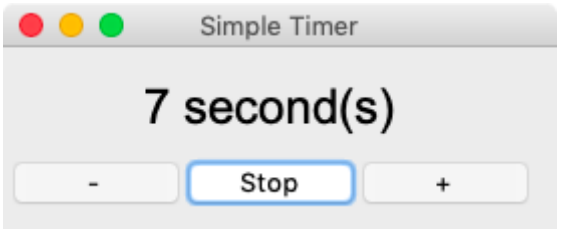
b. [10] The remaining time can never decrease below 0 seconds.

c. [20] When the **Start** button is clicked, the timer starts counting down every second with the label updated to the remaining time.

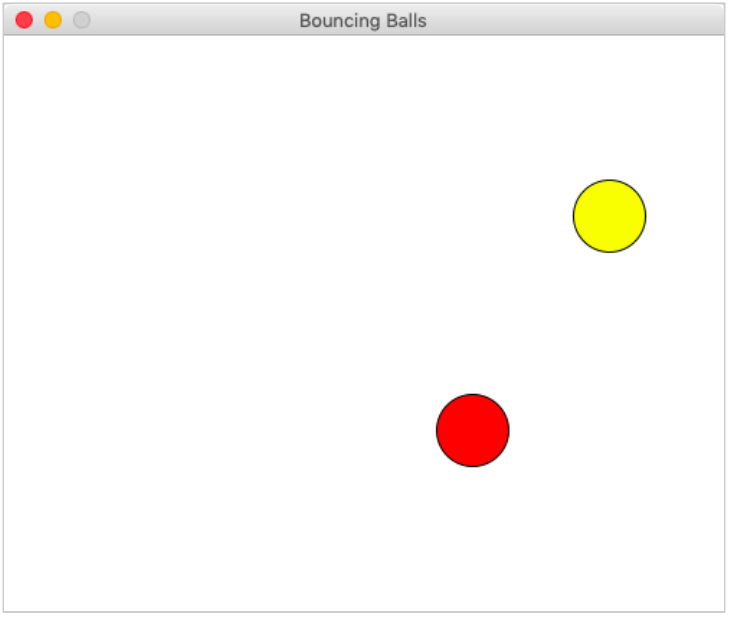
d. [20] When the timer is running, the **Start** button's label is changed to **Stop**. Clicking on the **Stop** button makes the timer stop at the current remaining time.

e. [10] Once the timer reaches zero, display the text **Time's up!** in place of the remaining time.

f. [20] While the timer is running, make the **-** and **+** buttons disabled, as shown below. Both buttons are re-enabled once the timer has stopped (either by clicking the **Stop** button, or the time is up).



2. [100] The code `bouncing-balls-stub.py` provides a code stub for animating two balls on the screen. The yellow ball is moving horizontally across the screen, while the red ball is moving up and down. Instead of showing two moving balls, the code *incorrectly* shows only one of them, the yellow ball.
    a. [50] Explain why the initial code does not work as expected. Save your explanation to the file `midterm-2.2a.pdf`.
    b. [50] Copy the code stub to `bouncing-balls.py`. Modify the code so that both balls' positions are independently animated at 50 updates per second, as shown below.



Submission

- Create a folder, named ***StudentID_Firstname*_midterm2**, where ***StudentID*** is your KU ID and ***Firstname*** is your given name.
- Put the files to submit, `simple-timer.py`, `bouncing-balls.py`, and `midterm-2.2a.pdf`, into this folder.
- Zip the folder and submit the zip file to the course's Google Classroom at the end of the exam.