

# CS 115, Autumn 2021

## Programming Project #3: Stamps and Screensaver (20 points)

Due Tuesday, October 12th, 2021, 11:30 PM

This assignment tests your understanding of drawing groups of shapes in the same relative location and random numbers. Submit two Python programs in files named `stamps.py` and `screensaver.py`. (Use exactly these file names, including identical capitalization.) You also have the option of submitting `stamps_extra.py` for up to 3 points of extra credit.

### Description:

In the first part of this programming assignment, you will write code to draw five animals at any location the user specifies on a canvas. Four of these animals are described below. The fifth will be an animal of your choice. We will incorporate the code you write in a later project

In the second part of this assignment, you will write code to create an old-fashioned screensaver. In the 90s there were many screensavers that had a picture or two appear at a random location and then disappear and appear at another random location a couple seconds later. You will create a screensaver like this with your custom animal from the first part.

### Part 1: stamps.py

For this part of the assignment, write a program that prompts the user for five sets of x, y coordinates and then draws each of the animals at the x, y coordinates the user types. You can assume the user will type valid coordinates. Your prompts and formatting should look identical to the sample output shown to the right. The blue underlined numbers are user input. You do not need to display these in blue or underline them – this is just to help you tell the difference between what the user types and what your program should output.

```

Welcome to the CS 115 stamp program!
Type the x, y location you would like for the upper left
corner of an animal's picture when prompted.
Remember, 0, 0 is in the upper left corner of the window.

x coordinate for the snail? 0
y coordinate for the snail? 100

x coordinate for the turtle? 200
y coordinate for the turtle? 145

x coordinate for the rabbit? 350
y coordinate for the rabbit? 333

x coordinate for the cat? 280
y coordinate for the cat? 30

x coordinate for surprise animal? 30
y coordinate for surprise animal? 300
    
```

The image below shows what would be output after the user interaction on the right. The question mark represents your creative animal.

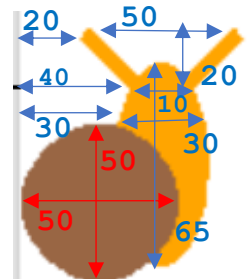
Do not open your drawing window until the user has entered the coordinates for every animal.



The instructions below describe how to draw each animal. Draw each of the animals at a single fixed position first. Then, once you have that working, start incorporating a variable for x. Once that works, incorporate one for y. Animals are listed from easiest to hardest. Therefore, we recommend you complete them in the order listed. You are welcome to choose any colors you wish.

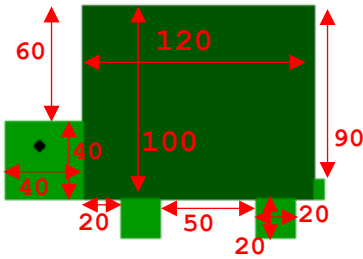
#### 1. Snail

The snail is made up of four shapes, an oval for the shell, an oval for the body and two lines for the antennae. The antennae have a stroke weight of 5. All other sizes and distances can be seen in the diagram to the right.



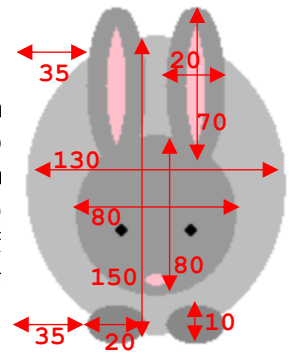
## 2. Turtle

The turtle is made of 5 rectangles for the body, head, legs and tail and one oval for the eye. The eye is 5 by 5, 70 from the top of the turtle and 15 from the left edge. The tail is 5 wide and 10 tall. Both legs are the same size. All other necessary measurements can be seen in the diagram to the left.



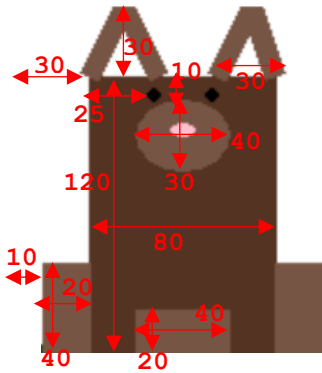
## 3. Rabbit

The rabbit is made of 11 ovals. The face, head and nose a oval is also used for each paw and each eye. Each ear is made of two ovals of the same size. On inside the ear) and the other is an outline with a stroke weight of 10. The eyes are 5 wide and 5 tall, and 5 further down than the center of the head, the nose is 10 wide and 30 from the bottom. The head is centered horizontally in the body and is placed vertically a third of the way up. The ears and feet are 20 apart. The ears start 10 above the body. The feet start 10 above the bottom



## 4. Cat

The cat is made of 4 rectangles, 4 ovals and 4 lines. The eyes are 5 wide, 5 tall and placed 5 from the top of the head. They are equally spaced horizontally around the center of the face. The pink part of the nose is 10 wide, 5 tall and vertically 10 below the outer nose circle. Both back legs are the same size as are the ears. The ears are made of lines with a stroke weight of 5.



## 5. Creative Animal

Draw any animal of your choice. You will get full credit as long as you meet the following requirements:

1. Include at least 5 shapes
2. Include at least 2 colors
3. The shapes must stay in the same relative position to each other no matter what x and y the user enters
4. This cannot be the same or very similar to one of the required animals, a small problem, lab question or example from class.

## Part 2: screensaver .py

For this part of the assignment, you will create an animation similar to an old fashioned screensaver. For this animation, make your creative animal, described in part 1, appear at a random x, y location on a drawing panel. Every second, it should disappear and reappear at a different random location. It should always be drawn at a position that allows it to fit completely on the panel. For example, if the panel were 200 wide and your animal were 20 wide you would need to draw the animal at an x between 0 and 180.

Every time the animal is redrawn some part of it should be drawn in a different random color. The random color can be completely random or a random shade of a particular hue.

Include variables at the top of your code file that store the width of the panel, the height of the panel, the width of your animal, the height of your animal and the speed of your animation. If these variables' values are changed your program's behavior should change accordingly.

## Style Guidelines:

All of your code must be in a file that is runnable. You should **not** type each of your statements into the interpreter and run them one at a time.

Use variables to avoid repeating the same computations more than once. Make sure to pick good variable names that describe what the values the variables store represent. Names like `a`, `b`, `c`, `variable1`, `variable2`, `variable3`, `pmt`, `prple`, `ipp` and `tp` are not good variable names. If your names include multiple words separate them with an underscore. All names should be all lowercase.

Include a comment at the beginning of each of your files with some basic information and a description of the program in your own words. For example:

```
# Suzy Student, CS 115, Autumn 2049
# Programming Project #1, 06/07/49
#
# This program's behavior is ...
```

You should also include a comment on each section of your code describing what it does. For example, include a comment above the section of instructions that draw each animal.

For `stamps.py`, you should limit yourself to the Python features covered in the first nine lectures. Though we will cover more material while you work on this assignment, please do not use any of it in this program, such as `if/else` statements. You may use advanced material in `screensaver.py`.

## Submission and Grading:

Turn in your Python source code files electronically from the Project page on the course web site.

Part of your program's score will come from its "external correctness." External correctness measures whether the output matches exactly what is expected. We are very picky about the output matching exactly and expect every character and space to match. Use the **output comparison tool** to help you make sure your output is perfect. Programs that do not run will receive no external correctness points.

The rest of your program's score will come from its "internal correctness." Internal correctness measures whether your source code follows the stylistic guidelines specified in this document. This includes having an adequate comment header and using `drawing_panel`, `expressions` and `variables` well. You should make sure to name your variables with descriptive names in all lowercase and underscores between words. You should also limit the lengths of all lines in your program to **fewer than 80 characters**.

## Extra Credit (3 Points):

You can earn up to 3 extra credit points submitting `stamps_extra.py`.

This program should be identical to part 1 of this project except that it should also prompt the user for a scale factor for each of the animals. Then, when it draws them, it should draw them at that scale. You can pick any number you like for the default scale. However, the animal must change if this value is altered.

Even if you submit this extra credit, you must still submit `stamps.py` with the output described in part 1. This is not a substitute.

```
Welcome to the CS 115 stamp program!
Type the x, y location you would like for the upper left
corner of an animal's picture and the scale you would
like to draw it at when prompted.
Remember, 0, 0 is in the upper left corner of the window.

x coordinate for the snail? 0
y coordinate for the snail? 100
scale for the snail? 100

x coordinate for the turtle? 200
y coordinate for the turtle? 145
scale for the turtle? 50

x coordinate for the rabbit? 350
y coordinate for the rabbit? 333
scale for the rabbit? 200

x coordinate for the cat? 280
y coordinate for the cat? 30
scale for the cat? 125

x coordinate for surprise animal? 30
y coordinate for surprise animal? 300
scale for the surprise animal? 90
```