

Programming Project #4

This assignment is worth 30 points (3.0% of the course grade) and must be completed and turned in **before 11:59 on Monday, October 8 (two weeks because of the first exam)**.

Assignment Overview

In this assignment you will practice with functions.

Background

This assignment is conceptually simple: draw an American flag using turtle graphics. The exercise is to use functions. There is a Wikipedia page (http://en.wikipedia.org/wiki/American_flag) that has specifications for dimensions that are very useful—all dimensions are derived from a specified height (A).

Project Specification

You must use at least the four functions specified below. You are encouraged to use more functions of your own design. For example, I found that it was useful to have a function that drew a row of stars.

Important specification: *global variables are not allowed*. That is, any variable names used within any function must be parameters or be created in the function (appear on the lhs of an assignment).

1. A function to draw a rectangle name `draw_rectangle` and fills it with the color.
`draw_rectangle(length,height,color)`
 - Parameters: `length` (float), `height` (float), `color` (string)
 - Returns nothing
2. A function to draw a star named `draw_star` and fills it with the color.
`draw_star(size,color)`
 - Parameters: `size` (float), `color` (string)
 - Returns nothing
3. A function to determine rgb colors named `get_color` from a parameter color string.
`get_color(color)`
 - Parameter: `color` (string)
 Use color strings such as “red”, “blue”, and “white”.
 - Returns: `r`, `g`, `b` (floats (or ints if you changed the turtle colormode setting))
 Note that a return can have multiple comma-separated parts so you can use
`return r, g, b`
 if your function call is of the form
`r, g, b = get_color("red")`
 Also, you may have more than one `return` statement in one function.
 (Python note: later you will learn that you really aren't returning three things, but instead it is one collection (a tuple) of three things.)
4. A function `draw_flag` to draw a flag of a certain height (“A” from Wikipedia dimensions) according to the official specifications as noted in the Wikipedia article. The exception is in the size and spacing of stars—following the exact specification of stars and their spacing is not worth the effort so simply making stars look good is satisfactory.
`draw_flag(height)`

- Parameter: `height` (float)
- Returns nothing

Deliverables

You must use Handin to turn in the file `proj04.py` – this is your source code solution; be sure to include your section, the date, the project number and comments describing your code. Please be sure to use the specified file name, and save a copy of your `proj04.py` file to your H: drive as a backup.

Notes and Hints:

1. Colors. You may use simple colors, e.g. “red” is the `rgb(1,0,0)`, or you can use the official colors as described on the Wikipedia page. You may also be creative with colors as long as there are the correct stripes and stars, and at least three colors.
2. Stars. For full credit you need all 50 stars arranged in 5 rows of 6 and 4 rows of 5. For 10% fewer points you may use the original 13 stars arranged in 3 rows of 3 and 2 rows of 2.
3. Using `turtle.speed(100)` is helpful to draw fast, but I suggest that you begin with slow drawing so you can better observe what is happening. Make your TA happy by including `turtle.speed(100)` in your final version of your `draw_flag` function.

Example Output:

