CPS106 Assignment 1

Learning Objectives:

The learning objectives of this assignment are:

1) To show and manipulate an image in Python.
2) To implement decisions using if statements.
3) To write loops in Python (for or while).
4) To write a function in Python.

Modifying an image using the Python library PIL

In class we wrote the following simple image manipulation program.

```
#!/usr/bin/python3
from PIL import Image
black = (0, 0, 0)

def blacken(w, h, map, x, y, LIMIT) :
    for i in range(-LIMIT, LIMIT) :
        x1 = x + i
        for j in range(-LIMIT, LIMIT) :
            y1 = y + j
            if 0 <= x1 < w and 0 <= y1 < h :
                map[x1, y1] = black

# ---------------------------------------------------------------
#  Open an image
# ---------------------------------------------------------------
beach = Image.open("beach.jpg")
# ---------------------------------------------------------------
#  Show it
# ---------------------------------------------------------------
beach.show()
# ---------------------------------------------------------------
#  Get the width and height
# ---------------------------------------------------------------
(w, h) = beach.size
# ---------------------------------------------------------------
#  Get the map
# ---------------------------------------------------------------
map = beach.load()
# ---------------------------------------------------------------
#  Draw an X on the image
# ---------------------------------------------------------------
m = h / w
for x in range(w) :
    y = int(m * x)
    #map[x, y] = black
    blacken(w, h, map, x, y, 2)
    y = h - 1 - int(m * x)
    y = max(0, y)
    #map[x, y] = black
    blacken(w, h, map, x, y, 2)
# ---------------------------------------------------------------
#  Show with the X
# ---------------------------------------------------------------
beach.show()
```

To Do:

1) Write a program in the style of the one above, but with your own function and your own image manipulation (hopefully more interesting than my X) and your own image.
2) Submit on D2L your program called a1.py, i.e., a Python program that the TA can run.
3) Also submit on D2L a short document showing the input and output image, and some words to describe what you did and how you did it.

Note: You cannot use any other image manipulation library; you cannot use numpy or any other library. You can only use what we have learned so far in this course. Although discussion with others is allowed, you must write your own code. You cannot use an AI (such as a chatbot) to write your code.

Marking: 7 points for doing what is required (1, 2 and 3), 3 points for quality (interest) of the image manipulation, 1 point for briefly showing your images in class and saying what you did. Total = 10 pts.