COMP1405B (Fall 2015)

Assignment 2 of 6

Due: Monday, October 19th by 11:30pm

For each question in this assignment ***you will be submitting three files containing source code written in Python 3, that have been compressed into a "zip" file.*** *The* ***Python sources*** *(i.e., the .py files)* ***should be named "a3q1.py", "a3q2.py", and "a3q3.py"****. The* ***zip file should be named a3.zip****. You will* ***submit your file using cuLearn****.*

A LATE POLICY IS IN EFFECT FOR THIS ASSIGNMENT
LATE ASSIGNMENTS WILL BE ACCEPTED FOR 48 HOURS AFTER THE DEADLINE AT A PENALTY OF 2.0% / HOUR

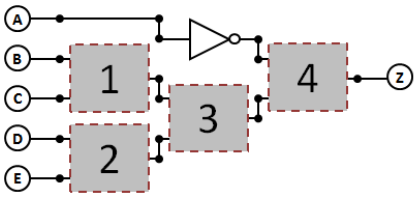
You are expected to ***demonstrate good programming practices at all times*** *(e.g., choosing descriptive variable names, provide comments in your code, etc.) and* ***your code may be penalized if it is poorly written****. You are also expected to* ***do the necessary preparatory work*** *(i.e., devising an algorithm)* ***before you start coding****.*

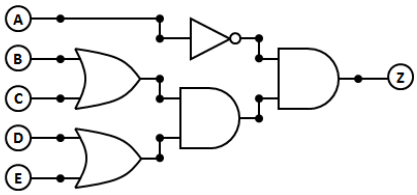
PLEASE NOTE: YOU WILL BE ASKED TO PRESENT EITHER PSEUDOCODE OR A FLOWCHART BEFORE YOU WILL RECEIVE ANY ASSISTANCE FROM THE INSTRUCTOR OR A TEACHING ASSISTANT

Question 1 – Writing a Function to Evaluate the Result of a Circuit

For this question you will create a program that will solve the result for a circuit specified by the last four digits of your student number, according to some input provided by the user. Your program will need to prompt the user for five Boolean values (for A, B, C, D, and E) and then use Python's and, or, and not operators to evaluate and print the result, Z.

Since each of you has a student number that is at least four digits long, the last four digits can be used to specify the logical operations for the four missing components in the circuit schematic provided, depending on whether each of the last four digits is odd or even. If the digit is odd, the corresponding component should be an "AND" gate, and if the digit is even, the corresponding component should be an "OR" gate.





As a clarifying example, the last four digits of the nine digit student number 101002479 are 2, 4, 7, and 9. Since 2 and 4 are even there should be "OR" gates for components 1 and 2, but since 7 and 9 are odd there should be "AND" gates for components 3 and 4.

You program is expected to include a function called evaluateMyCircuit that takes five Boolean arguments and provides the return value that is the Boolean result of evaluating your circuit with the arguments provided. For the example circuit above right, Boolean values of False, True, False, True, and False for the five arguments (A, B, C, D, and E) should produce a return value of True (at Z in the figure above). Your main program will print your student number and then ask the user to input five Boolean values (by typing T for True and F for False). Your main program will then call your function and print the return value, and then draw your circuit using primitive functions (i.e., line, curve, etc.) from SimpleGraphics.

Question 2 – Writing a Chroma-Keying Program

For this question you will create a program that uses SimpleGraphics to perform a simple chroma keying (also known as green screening) operation, to merge two images. The first image, to be used as the background, depicts a hallway and will be a gif of size 800 × 600. The second image will contain an image of a monster (200 × 350) depicted against a green background (i.e., pixels where the red = 0, the green = 255, and the blue = 0). Your task will be to overlay a semi-transparent image of the monster on top of the background, centered at a point defined by the user. The result will be an image where the monster appears as a ghost, as depicted in the example below.

This is a deceptively simple problem (and is likely to be much shorter that some of your previous programs) but **you must start by thoroughly reading the COMP1405B-F15-W02-00-(Simple Graphics Tutorial - Part 2 of 2).pdf** file that was posted to cuLearn. Your program should begin by asking the user for the images and the co-ordinates for centering, and then you should use loops to check each of the pixels in the foreground image. If the pixel is green, you should do nothing to the background image, but if the pixel is anything other than green you should average the red, green, and blue pixel values of the foreground and the background. This will achieve the semi-transparency effect.

Your program **must not use global variables** and **MUST BE ORGANIZED INTO FUNCTIONS**, separating the task of getting the information from the user from actually creating the chroma-keyed image (i.e., you must have at least two functions, and then a main program that calls your functions as needed). Your program should begin by prompting the user for the name of the background and monster images, and the x and y co-ordinates. If the user provides invalid x and y co-ordinates, your program must re-prompt. This program will (obviously) require several loops, and you are expected to use for loops when working with pixels and while loops when dealing with user input. Finally your program is expected to draw the semi-transparent monster image (minus the green background) centered on the point (x, y) provided by the user.

Question 3 – Rewriting you Chroma-Keying Program to Accept Mouse Input

For the third and final question, rewrite your input gathering function so that it uses a while loop with function calls to SimpleGraphics's mousePos and leftButtonPressed functions to get the location from the user, instead of using input statements. Do not add any global variables or make any changes to your main program or the function that actually draws the monster - the only difference between your "a3q2.py" and your "a3q3.py" should be the way your input function works.

Hint: If both your input functions (for Questions 2 and 3, respectively) took no arguments and had four return values - the two image objects and the co-ordinates for the point (x, y) at which to center the monster - and your drawing function took these four return values as arguments you should be able to use your input functions interchangeably.