Midterm exam: Part 1

CSE241

April 20, 2023

This is worth 50% of your midterm exam.
Makefiles are not required to be submitted. Only 1 .cc/.cpp file needs to be submitted.

1 Area of shapes

You are to write a complete C++ program which calculates the area of shapes.

1. Define a data type `struct shape`. It must (via polymorphism) support circles and rectangles. A circle is represented by a radius (`double`) and a rectangle is represented by a length and a width (both `double`s). (2 points)
2. Write a function which calculates the area of a shape. It is up to your discretion whether to use pointers or not. The function does not need to be documented. (3 points)
3. Write a function which calculates the average area of an array of shapes. You **must** call the funtion defined in part 2 to receive full marks. The funtion does not need to be documented. (3 points)
4. Write a `main` function. It must define an array of 4 shapes as follows: (circle with radius 1, circle with radius 0.5, rectangle 2.5x14, rectangle 5x5) (2 points)
5. Have your `main` function call your average area function to print out the average area of the first two shapes (the circles). You should get an answer of approximately 1.9635 (1 point)
6. Have your `main` function call your average area function to print out the average area of the list two shapes (the rectangles). You should get an answer of 30 (1 point)
7. Have your `main` function call your average area function to print out the average area of all 4 shapes. You should get an answer of approximately 15.9817 (1 point)