

Computer Project #2

Assignment Overview

This assignment focuses on the design, implementation and testing of a Python program to help plan an ornamental garden (see below).

It is worth 20 points (2% of course grade) and must be completed no later than 11:59 PM on Monday, January 20.

Assignment Specifications

You will write a program that calculates the amount of materials needed for an ornamental garden according to the design shown on the right.

In the design, the green areas represent flowerbeds and the grey areas contain fill material (such as stone or mulch). The garden is a perfect square. The four outer flowerbeds are congruent isosceles triangles. The central flowerbed is a circle which is centered in the garden; its diameter is half the side-length of the garden.



Your program will prompt the user for the following information:

1. The length of one side of the garden (in feet).
2. The recommended spacing between plants (in inches).
3. The depth of the flowerbeds (in feet).
4. The depth of the fill areas (in feet).

Your program must prompt the user (and accept input) in the exact order shown above.

Your program will then calculate and report the following quantities needed for the garden:

1. Number of plants for each type of flowerbed and total number of plants for the garden.
2. Cubic yards of soil for each type of flowerbed and total cubic yards of soil for the garden, rounded to one decimal place.
3. Total cubic yards of fill material for the garden, rounded to one decimal place.

Assignment Deliverable

The deliverable for this assignment is the following file:

proj02.py – the source code for your Python program

Be sure to use the specified file name (“proj02.py”) and to submit it for grading via the **handin** system before the project deadline.

Assignment Notes

To clarify the project specifications, sample output is provided at the end of this document.

Your program must produce the correct results for valid inputs. However, it is not expected to handle invalid inputs (such as negative values). Thus, it is unnecessary to use selective or repetitive control statements (ifs and loops) in your program.

The formula for the area A of a circle is $A = \pi r^2$, where r denotes the radius. For this calculation, you will use the value of π provided in the Python `math` module. After importing the `math` module, the name `math.pi` represents a close approximation to the value of π .

To estimate the number of plants needed for a flowerbed, divide the area of the flowerbed by the area needed per plant (the square of the recommended distance between plants) and then truncate this result. To truncate a value of type `float`, convert it to a value of type `int` (using the `int` function).

The program named `example.py` in the project directory contains example usages of many of the Python features you will use in this project (with explanations in the comments).

Suggested Procedure

- *Solve the problem using pencil and paper first.* You cannot write a program until you have figured out how to solve the problem. This first step is best done collaboratively with another student. However, once the discussion turns to Python specifics and the subsequent writing of Python statements, you must work on your own.
- Write a simple version of the program. Run the program and track down any errors.
- Use the **handin** system to turn in the first version of your program.
- Cycle through the steps to incrementally develop your program:
 - Edit your program to add new capabilities.
 - Run the program and fix any errors.
- Use the **handin** system to submit your final version.
- Be sure to log out when you leave the room, if you're working in a public lab.

*Be sure to save a copy of your completed program in your CSE file space (H: drive on the lab machines) **before** the project deadline. If you write your program at home and turn it in from home, you will need to copy it to your CSE file space **before** the deadline. In case of problems with electronic submission, an archived copy in the CSE file space is the only acceptable evidence of completion.*

Sample Output

```
Python Shell
>>> ===== RESTART =====
>>>
This program will help you plan your garden.
First, we need some information about the dimensions you want.

Please enter the side length for your garden (in feet): 12
Please enter the distance between plants (in inches): 6
Please enter the depth for the flower beds (in feet): 3
Please enter the depth for the fill (in feet): 2

Summary of your plant needs.
Each outer triangular bed: 72 plants.
The center circular bed: 113 plants.
Total: 401 plants.

Summary of your soil needs.
Each outer triangular bed: 2.0 cu. yd.
The center circular bed: 3.1 cu. yd.
Total: 11.1 cu. yd.

Summary of your fill needs.
Total: 3.2 cu. yd.
>>> ===== RESTART =====
>>>
This program will help you plan your garden.
First, we need some information about the dimensions you want.

Please enter the side length for your garden (in feet): 4
Please enter the distance between plants (in inches): 9
Please enter the depth for the flower beds (in feet): 1.5
Please enter the depth for the fill (in feet): 1.5

Summary of your plant needs.
Each outer triangular bed: 3 plants.
The center circular bed: 5 plants.
Total: 17 plants.

Summary of your soil needs.
Each outer triangular bed: 0.1 cu. yd.
The center circular bed: 0.2 cu. yd.
Total: 0.6 cu. yd.

Summary of your fill needs.
Total: 0.3 cu. yd.
>>>
```

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