

CPSC 1301, Computer Science I Programming Exercise

Week 02, Math Formulas

1 Instructions

Write a Python program. You should use the template below. Your output should be similar to the output shown below. More specific instructions follow. Name your program `MathFormulas_lastname.py`.

circle() Write a function that takes as input an integer as `radius`, computes the area of a circle with that radius and prints the area, and computes the circumference of a circle with that radius and prints the circumference. See the output below. Here are the formulas:

$$\text{Circumference} = 2\pi r$$

$$\text{Area} = \pi r^2$$

hemisphere() Write a function that takes as input an integer as `radius`, computes the volume of a hemisphere with that radius and prints the volume. See the output below. Here is the formula:

$$\text{Volume} = \frac{\frac{4}{3}\pi r^3}{2}$$

triangle() Write a function that takes as input three integers as `sideA`, `sideB`, and `sideC`, computes the area of a triangle with the three sides and prints the area. Use See the output below. Use Heron's method. Here is the formula:

$$p = \frac{a + b + c}{2}$$

$$\text{Area} = \sqrt{p(p-a)(p-b)(p-c)}$$

quadratic() Write a function that takes as input three integers as coefficients A, B, and C for a quadratic equation, computes both the positive and negative solutions if they exist, and prints the solutions. Remember that a quadratic equation may have no solution, one solution, or two solutions. Here are the appropriate formulas:

$$ax^2 + bx + c = 0$$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Your deliverable is *one* plain text file (that is, it should have a `.txt` extension), with your program source code at the top and the output at the bottom. **Name the file with the exercise number and your last name.** That is, my deliverable would be named `progex01_carter.txt`. Create a new plain text file using your favorite text editor, copy your source listing and paste it into the file, then copy the output and paste it into the file. You can generate an output text file by using the output redirection operator (`>`) like this:

PROMPT: `progex02.py > output02.txt`

2 Template

Please use this template for your program. You will need to import the `math` module if you want to use `math.pi` and `math.sqrt()`. Be sure to read the documentation at <https://docs.python.org/3/library/math.html>.

```

1  #!/python
2  # Name: MathFormulas.py
3  # Author: Student Name
4  # Date; current date
5  # Purpose: calculates data for circle, hemisphere, triangle, and quadratic equation
6
7  import math
8
9  def hello():
10     print("This is MathFormulas.py")
11
12  def circle():
13     print("calling circle()")
14     pass
15
16  def hemisphere():
17     print("calling hemisphere()")
18     pass
19
20  def triangle():
21     print("calling triangle()")
22     pass
23
24  def quadratic():
25     print("calling quadratic()")
26     pass
27
28  #main function executes the defined functions
29  if __name__ == '__main__':
30     hello()
31     circle()
32     hemisphere()
33     triangle()
34     quadratic()

```

3 Output

Your output should match this listing.

This is MathFormulas.py

calling circle()

Enter an integer greater than zero for the radius: 1

The area of the circle is 3.141592653589793

The circumference of the circle is 6.283185307179586

calling hemisphere()

Enter an integer greater than zero for the radius: 2

The volume of the hemisphere is 16.755160819145562

calling triangle()

Enter an integer greater than zero for side A: 3

Enter an integer greater than zero for side B: 4

Enter an integer greater than zero for side C: 5

The area of the triangle is 6.0

```
calling quadratic()  
Enter an integer for coefficient A: -2  
Enter an integer for coefficient B: 100  
Enter an integer for coefficient C: -2  
The positive result for X is 0.020008006406406764  
The negative result for X is 49.97999199359359
```