# Hands-on Exercise-III (Python)

**1.** Input an integer through the keyboard. Write a python program to find out whether it is an odd number or even number.

**2.** Any character is entered through the keyboard, write a python program to determine whether the character entered is a capital letter, a small case letter, a digit or a special symbol. The following table shows the range of ASCII values for various characters.

Characters ASCII Values

A – Z 65 – 90

a – z 97 – 122

0 – 9 48 – 57

special symbols 0 - 47, 58 - 64, 91 - 96, 123 – 127

**3.** The two roots of a quadratic equation $ax^2 + bx + c = 0$ can be obtained using the following formula:

$$r1 = \frac{-b+\sqrt{b^2-4ac}}{2a} \quad \text{and} \quad r2 = \frac{-b-\sqrt{b^2-4ac}}{2a}$$

*b*2 - 4*ac* is called the discriminant of the quadratic equation. If it is positive, the equation has two real roots. If it is zero, the equation has one root. If it is negative, the equation has no real roots.

Write a python program that prompts the user to enter values for *a*, *b*, and *c* and displays the result based on the discriminant. If the discriminant is positive, display two roots. If the discriminant is **0**, display one root. Otherwise, display "The equation has no real roots"

Here are some sample runs.

Enter a, b, c: 1.0 3 1

The equation has two roots -0.381966 and -2.61803

Enter a, b, c: 1 2.0 1

The equation has one root -1

Enter a, b, c: 1 2 3

The equation has no real roots

**4.** You can use Cramer's rule to solve the following 2 X 2 system of linear equation:

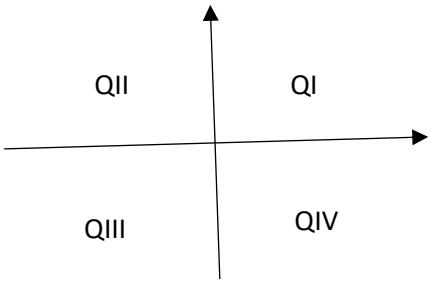
$$ax + by = e$$
$$cx + dy = f$$
$$x = \frac{ed - bf}{ad - bc}$$
$$y = \frac{af - ec}{ad - bc}$$

Write a python program that prompts the user to enter *a*, *b*, *c*, *d*, *e*, and *f* and displays the result. If *ad* - *bc* is **0**, report that "The equation has no solution."

Enter a, b, c, d, e, f: 9.0 4.0 3.0 -5.0 -6.0 -21.0
x is -2.0 and y is 3.0

Enter a, b, c, d, e, f: 1.0 2.0 2.0 4.0 4.0 5.0
The equation has no solution

**5.** Write a python program that takes the x – y coordinates of a point in the Cartesian plane and prints a message telling either an axis on which the point lies or the quadrant in which it is found.




Sample lines of output:

(-1.0, -2.5) is in quadrant III
(0.0, 4.8) is on the y-axis

**6.** If the ages of Rahul, Ayush and Ajay are input through the keyboard, write a python program to determine the elder among them.

**7.** Write a python program that prompts the user to enter the month and year and displays the number of days in the month. For example, if the user entered month **2** and year **2012**, the program should display that February 2012 had 29 days. If the user entered month **3** and year **2015**, the program should display that March 2015 had 31 days.

**8.** Write a python program that plays the popular scissor-rock-paper game. (A scissor can cut a paper, a rock can knock a scissor, and a paper can wrap a rock.) The program randomly generates a number **0**, **1**, or **2** representing scissor, rock, and paper. The program prompts the user to enter a number **0**, **1**, or **2** and displays a message indicating whether the user or the computer wins, loses, or draws.

Here are sample runs:

scissor (0), rock (1), paper (2): 1
The computer is scissor. You are rock. You won

scissor (0), rock (1), paper (2): 2
The computer is paper. You are paper too. It is a draw

**9.** Write a python program that prompts the user to enter a point (**x**, **y**) and checks whether the point is within the circle centered at (**0**, **0**) with radius **10**. For example, (**4**, **5**) is inside the circle and (**9**, **9**) is outside the circle,

(*Hint*: A point is in the circle if its distance to (**0**, **0**) is less than or equal to **10**. The formula for computing the distance is $\sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$ .Test your program to cover all cases.)

Two sample runs are shown below.

Enter a point with two coordinates: 4 5
Point (4.0, 5.0) is in the circle

Enter a point with two coordinates: 9 9
Point (9.0, 9.0) is not in the circle

**10.** A University conducts a 100 mark exam for its student and grades them as follows. Assigns a grade based on the value of the marks. Write a python program to print the grade according to the mark secured by the student.

| Mark Range | Letter Grade |
|---|---|
| >=90 | O |
| >=80 AND <90 | A |
| >=70 AND <80 | B |
| >=60 AND <70 | C |
| >=50 AND <60 | D |
| >=40 AND <50 | E |
| <40 | F |

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