PGR107 – Python Programming
Spring 2023
Review Exercises

1. Write a program that reads a letter of the alphabet from the user. If the user enters **a**, **e**, **i**, **o** or **u** then your program should display a message indicating that the entered letter is a **vowel**. If the user enters **y** then your program should display a message indicating that **sometimes y is a vowel, and sometimes y is a consonant**. Otherwise, your program should display a message indicating that **the letter is a consonant**.

2. Write a program that determines the name of a shape from its number of sides. Read the number of sides from the user and then report the appropriate name as part of a meaningful message. Your program should support shapes with anywhere from 3 up to (and including) 10 sides. If a number of sides outside of this range is entered, then your program should display an appropriate error message.

3. The length of a month varies from 28 to 31 days. Write a program that reads the name of a month from the user as a string. Then your program should display the number of days in that month. Display "28 or 29 days" for February so that leap years are addressed.

4. A triangle can be classified based on the lengths of its sides as equilateral, isosceles or scalene. All three sides of an equilateral triangle have the same length. An isosceles triangle has two sides that are the same length, and a third side that is a different length. If all of the sides have different lengths, then the triangle is scalene. Write a program that reads the lengths of the three sides of a triangle from the user. Then display a message that states the triangle's type.

5. The year is divided into four seasons: spring, summer, fall (or autumn) and winter. While the exact dates that the seasons change vary a little bit from year to year because of the way that the calendar is constructed, we will use the following dates for this exercise:

Season	First Day
Spring	March 20
Summer	June 21
Fall	September 22
Winter	December 21

   Write a program that reads a month and day from the user. The user will enter the name of the month as a string, followed by the day within the month as an integer. Then your program should display the season associated with the date that was entered.

6. The Chinese zodiac assigns animals to years in a 12-year cycle. One 12-year cycle is shown in the table below. The pattern repeats from there, with 2012 being another year of the dragon, and 1999 being another year of the hare.

Year	Animal
2000	Dragon
2001	Snake
2002	Horse
2003	Sheep
2004	Monkey
2005	Rooster
2006	Dog
2007	Pig
2008	Rat
2009	Ox
2010	Tiger
2011	Hare

Write a program that reads a year from the user and displays the animal associated with that year. Your program should work correctly for any year greater than or equal to zero, not just the ones listed in the table.

7. At a particular company, employees are rated at the end of each year. The rating scale begins at 0.0, with higher values indicating better performance and resulting in larger raises. The value awarded to an employee is either 0.0, 0.4, or 0.6 or more. Values between 0.0 and 0.4, and between 0.4 and 0.6 are never used. The meaning associated with each rating is shown in the following table. The amount of an employee's raise is $2,400.00 multiplied by their rating.

Rating	Meaning
0.0	Unacceptable Performance
0.4	Acceptable Performance
0.6 or more	Meritorious Performance

Write a program that reads a rating from the user and indicates whether the performance for that rating is unacceptable, acceptable or meritorious. The amount of the employee's raise should also be reported. Your program should display an appropriate error message if an invalid rating is entered.

8. Write a program to compute and display a person's weekly salary as determined by the following specification "If the hours worked are less than or equal to 40, the person receives $8 per hour; else the person receives $320 plus $12 for each hour worked over 40 hours". The program should request the hours worked as input and should display the salary as output. A sample run would be as follows:

```
Please enter the hours worked: 20
Your salary is: 160 Dollars
```

Another sample run:

```
Please enter the hours worked: 60
Your salary is: 560 Dollars
```

9. A senior salesperson is paid $800 a week and a junior salesperson $375 a week. Write a program that accepts as input a salesperson's status in the character variable. If the status entered is 's', the senior person's salary will be displayed and else the junior person's salary should be output. A sample run would be as follows:

```
Please enter the status of the salesperson (s/j): s
The salary of the senior salesperson is $800 per week.
```

10. Write a program with first **while loop** and then **for loop** that calculates the value of f (x) for x between 1 and 5 in increments of 1.

$$f(x) = 1 + x + \frac{x^2}{2} + \frac{x^3}{6} + \frac{x^4}{24}$$

A sample run would be as follows:

```
x = 1 --> f(x) =  2.71
x = 2 --> f(x) =  7.00
x = 3 --> f(x) =  16.38
x = 4 --> f(x) =  34.33
x = 5 --> f(x) =  65.38
```

11. Write a program that simulates the toss of a coin. The result can be either head or a tail. Assume that you toss the coin 1000 times. The program should report the number of heads and tails.

12. Write a function to return the volume of a sphere with the input argument for the radius of the sphere. The formula for the volume of the sphere is $\frac{4}{3}\pi r^3$, where r is the radius of the sphere.

13. Write a function, which calculates the value of the following function. Your function should take x as float and return a float value.

$$g(x) = \begin{cases} -x^2 + 4 & \text{if } x < 1 \\ 2x - 1 & \text{if } x \geq 1 \end{cases}$$