**Week 03 Tutorial / Computer Lab**

**Unit 2: Software Development Life Cycle, Data Types and Expressions**

**Exercises and Coding Labs**

* **TUTORIAL: Complete tutorial activities every week in MindTap, and submit it at the end of scheduled tutorial session.**

1. *List four phases of the software development process, and explain what they accomplish.*
2. *Jack says that he will not bother with analysis and design but proceed directly to coding his programs. Why is that not a good idea?*
3. Let the variable x be **"dog"** and the variable **y** be**"cat"**. Write the values returned by the following operations:  
     
   
4. Write a string that contains your name and address on separate lines using embedded newline characters. Then write the same string literal without the newline characters.
5. How does one include an apostrophe as a character within a string literal?
6. What happens when the print function prints a string literal with embedded Newline characters?
7. Which of the following are valid variable names?  
     
   Text

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8. List two of the purposes of program documentation.
9. Which data type would most appropriately be used to represent the following data values?  
     
   a. The number of months in a year  
     
   b. The area of a circle  
     
   c. The current minimum wage  
     
   d. The approximate age of the universe (12,000,000,000 years)  
     
   e. Your name
10. Explain the differences between the data types**int** and **float**.
11. Write the values of the following floating-point numbers in Python's scientific notation:  
      
    a. 355.76  
      
    b. 0.007832  
      
    c. 4.3212
12. Consult Table 2-5 to write the ASCII values of the characters**'$'** and **'&'**.
13. Let **x** =8 and **y** =2. Write the values of the following expressions:  
      
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1. Let**x** =4.66 Write the values of the following expressions:  
     
   
2. How does a Python programmer round a **float** value to the nearest **int** value?
3. How does a Python programmer concatenate a numeric value to a string value?
4. Assume that the variable **x** has the value 55. Use an assignment statement to increment the value of **x** by 1.
5. Explain the relationship between a function and its arguments.
6. The **math** module includes a **pow** function that raises a number to a given power. The first argument is the number, and the second argument is the exponent. Write a code segment that imports this function and calls it to print the values 82 and 54.
7. Explain how to display a directory of all of the functions in a given module.
8. Explain how to display help information on a particular function in a given module.

* **Computer Lab: Complete the Python Coding activities every week in MindTap Coding Lab Sandbox enviroment, and submit at the end of scheduled tut/lab session.**

**Programming Activity 1 :**

The tax calculator program of the case study outputs a floating-point number that might show more than two digits of precision.

Use the round function to modify the program to display at most two digits of precision in the output number.

Below is an example of the program input and output:

Enter the gross income: 12345.67

Enter the number of dependents: 1

The income tax is $-130.87

**Programming Activity 2:**

You can calculate the surface area of a cube if you know the length of an edge.

Write a program that takes the length of an edge (an integer) as input and prints the cube’s surface area as output.

An example of the program input and output is shown below:

Enter the cube's edge: 4

The surface area is 96 square units.

**Programming Activity 3:**

Five Star Retro Video rents VHS tapes and DVDs to the same connoisseurs who like to buy LP record albums. The store rents new videos for **$3.00** a night, and oldies for **$2.00** a night.

Write a program that the clerks at Five Star Retro Video can use to calculate the total charge for a customer’s video rentals.

The program should prompt the user for the number of each type of video and output the total cost.

An example of the program input and output is shown below:

Enter the number of new videos: 3

Enter the number of oldies: 2

The total cost is $13.0

**Programming Activity 4:**

Write a program that takes the radius of a sphere (a floating-point number) as input and then outputs the sphere’s:

1. Diameter (2 × radius)
2. Circumference (diameter × π)
3. Surface area (4 × π × radius2)
4. Volume (4/3 × π × radius3)

For convenience, the program can import the math module.

Below is an example of the program input and output:

Radius = 5

Diameter : 10.0

Circumference: 31.41592653589793

Surface area : 314.1592653589793

Volume : 523.5987755982989

**Programming Activity 5:**

An object’s momentum is its mass multiplied by its velocity.

Write a program that accepts an object’s mass (in kilograms) and velocity (in meters per second) as inputs, and then outputs its momentum.

Below is an example of the progam input and output:

Mass: 5

Velocity: 2.5

The object's momentum is 12.5

**Programming Activity 6:**

**Extend the programming activity 5 to compute the kinetic energy and display it along with the momentum.**

The formula for computing kinetic energy is

kineticEnergy = 0.5 x (mass x velocity2)

**Programming Activity 7:**

Write a program that calculates and prints the number of minutes in a year.

Assume the following:

* 1 year = 365 days (Ignore leap years)
* 1 day = 24 hours
* 1 hour = 60 minutes

Below is an example of the correct output format:

The number of minutes in a year is X

**Programming Activity 8:**

Light travels at 3 × 108 meters per second. A light-year is the distance a light beam travels in one year.

Write a program that calculates and displays the value of a light-year.

Useful facts:

* Seconds in a year = 365×24×602
* Rate = 3×108 meters per second

Below is an example of the correct output format:

Light travels X meters in a year.

**Programming Activity 9:**

Write a program that takes as input a number of kilometers and prints the corresponding number of nautical miles.

Use the following approximations:

* A kilometer represents 1/10,000 of the distance between the North Pole and the equator.
* There are 90 degrees, containing 60 minutes of arc each, between the North Pole and the equator.
* A nautical mile is 1 minute of an arc.

An example of the program input and output is shown below:

Enter the number of kilometers: 100

The number of nautical miles is 54

**Programming Activity 10:**

An employee’s total weekly pay equals the hourly wage multiplied by the total number of regular hours, plus any overtime pay.

Overtime pay equals the total overtime hours multiplied by 1.5 times the hourly wage.

Write a program that takes as inputs the hourly wage, total regular hours, and total overtime hours and displays an employee’s total weekly pay.

Below is an example of the program inputs and output:

Enter the wage: $15.50

Enter the regular hours: 40

Enter the overtime hours: 12

The total weekly pay is $899.0