Decision

1. Write the code to print the state of the water based on the temperature of the water as given in the table below.

Temperature	State
Greater than or equal to 100^0C	Gas
Between 0^0C and 100^0C	Liquid
Less than or equal to 0^0C	Solid

2. Write a Zoo ticketing application.
   The ticketing application allows a group buy:
   - Adult-$15
   - Child-$10
   - Animal show is $5 per person (group purchase)
   - Free sunshade for all person if total purchase is above $100
   - 10% discount if spend above $150 or is a "Friend of Zoo"

List

3. Given the code below:

names = ['alan', 'peter', 'john']

- Write the code to add 'mary' to the end of list
- Write the code to add 'bob' as the first item of the list
- Write the code to remove 'peter' from the list
- Write the code to remove the 2nd item from the current list
- Write the code to print out the number of people in the list.

Loop

4. Write the code to generate and print the numbers in the sample output using a **while** loop.

(a) Increasing Numbers	(b) Decreasing Numbers
3 7 11 15 19 23	30 28 26 24 22 20

5. Write the code to generate and print the numbers in the sample output using a **for** loop.

(a) Increasing Numbers	(b) Decreasing Numbers
12 15 18 21 24	46 42 38 34 30 26

6. Write the codes to produce the following patterns using ***for-loop*** with the input n.

a. n=5 A|A|A|A|A| A|A|A|A|A| A|A|A|A|A| A|A|A|A|A| A|A|A|A|A|	b. n=5 += +=+= +=+=+= +=+=+=+= +=+=+=+=+=
c. n=5 B|B|B|B|B| B|B|B|B| B|B|B| B|B| B|	d. n=5 :>:>:>:>:> :P :>:>:>:> :P:P :>:>:> :P:P:P :>:> :P:P:P:P :> :P:P:P:P:P

7. Write a program called HarmonicSum to compute the sum of a harmonic series, as shown below, where **n**=50000.

$$Harmonic(n) = 1 + \frac{1}{2} + \frac{1}{3} + \cdots + \frac{1}{n}$$

8. Write a program called Fibonacci to display the first n Fibonacci numbers F(n), where F(n)=F(n–1)+F(n–2) and F(0)=0, F(1)=1.
The first 20 Fibonacci numbers are: 0 1 1 2 3 5 8 13 21 34 55 89 144 233 377 610 987 1597 2584 4181

List and Loop

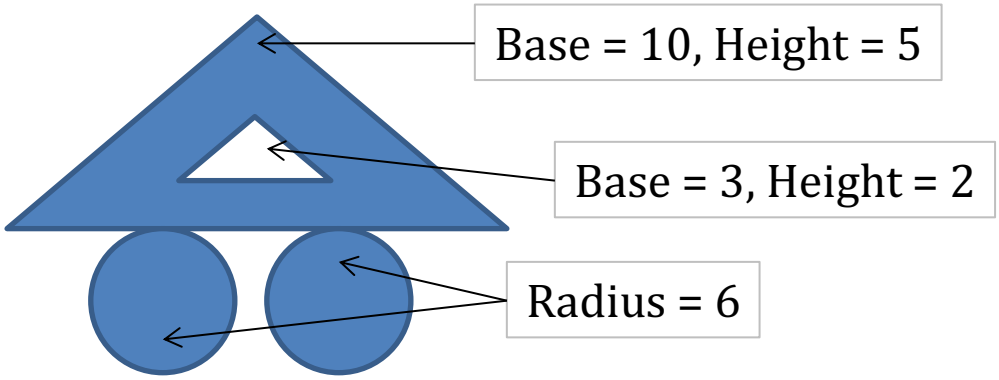
9. animals = ["fish","cat","dog","lion","tiger","mouse","cow"]
   Suppose the above codes are at the start of a python program.
   a) Using a **for** loop, print all the animals
   b) Using a **for** loop, print all the animals in reverse order
   c) Using a **for** loop, print all the animals with 3 letters.

10. Write a program to keep reading in numbers into a list until the user enter a letter q. Print the max, min, average and sample standard deviation of all the numbers.

Function

11. Write/define a function **area_circle** that takes in the radius to calculate and return the area of a circle. *(Note: You can take pi to be 3.142)*
    Write/define a function **area_triangle** that takes in the base and height to calculate and return the area of a triangle. *(Note: Area of triangle = (base * height) /2)*
    Use the above functions to **calculate** the total area of the shaded region in the figure below and **print** the result.
    Sample Output is given below

```
Total area of the shaded region is 248.224
>>>
```



12. Write codes to perform the following tasks:
    a. Define a function **number_range** that takes in four numbers
    b. The function returns the smaller and the largest number.

(Try to implement the function without using the Math min and max function)

13. The following Dictionary Laptops contain the brand and stock level of laptop.

Laptops = {'acer': 20, 'hp':10, 'toshiba': 15, 'apple':12}

a. Using a for loop, write the code to produce similar output as follows:

```
acer:20
hp:10
toshiba:15
```

b. Write the code to **print** the brand of all the laptops that have a stock level of 15 or more.

c. Write the code to **calculate and print** the total number of laptop available

14. Given the following lists:

    names = ['alan', 'peter', 'mary', 'john']
    ages = [17, 18, 19, 20]

    Using a for loop, combine the 2 lists to create a dictionary. Your dictionary should contain the following data:

```
{'john': 20, 'peter': 18, 'mary': 19, 'alan': 17}
```

Note: Your code should work for any two lists with the same number of elements.

Object Oriented Programming

Write a Staff class for a HR wage System.
The staff class consist of name, department, position, grade, monthly salary and performance score.

Grade is an integer from 1 to 5 and is used to calculate overtime pay and yearend bonus.

Grade	Overtime calculation
1 to 3	Nil
4	$10 per hour – max of $200
5	$5 per hour – max of $300

Year-end bonus is calculated based on grade and performance score
Performance score is a float value from 1 to 10.

Grade	Year-end bonus
1	Monthly salary * 2/grade * Performance score
2	
3	
4	
5	

Implement the Staff class with the necessary attributes and methods.

Write the test code for the Staff class.