1. Write a Python Program that reads an integer data from the keyboard. If it is even and positive, then it is divided by 2; if it is even and negative, then it is multiplied by 2; if it is odd and positive, then 1 is subtracted from it; otherwise if it is odd and negative, then 1 is added to it. Print the result.

Code-

```
n=int(input("Enter a number "))
if n%2==0:
   if n>0:
      n/=2
   else:
      n*=2
else:
    if n>0:
      n-=1
    else:
      n+=1
print("The value of number is ",n)
```

2. Write a Python program that reads three integers from the user and prints the second largest.

Code-

```
a,b,c=eval(input("Enter three numbers "))
if a>b and a<c:
   print("the second largest number is ",a)
elif a>c and a<b:
   print("the second largest number is ",a)
elif b>a and b<c:
   print("the second largest number is ",b)
elif b>c and b<a:
   print("the second largest number is ",b)
elif c>a and c<b:
   print("the second largest number is ",c)
```

```
elif c>b and c<a:
    print("the second largest number is ",c)
else:
    print("Wrong input")
```

3. Read of three inputs float variables sideA, sideB and sideC with positive values and if sideA, sideB and sideC were lengths of sides, write a complete Python program to determine if they form a valid triangle or not. If so, whether they form a Pythagorean triplet or not.

Code-

```
sideA,sideB,sideC=eval(input("Enter three sides "))
if(sideA<sideB+sideC and sideB<sideA+sideC and sideC<sideB+sideA):
    print("The triangle is valid ",end="")

    if(sideA**2==sideB**2+sideC**2) or (sideB**2==sideA**2+sideC**2) or
(sideC**2==sideB**2+sideA**2):
        print("and form a Pythagorean Triplet")
    else:
        print("but do not form a pythagorean Triplet")
else:
    print("Not a valid triangle")
```

4. Write a Python program that reads three positive numbers as the lengths of three sides of a triangle. It computes the area of the triangle using Heron's formula:
where s = (a + b + c)/2.
Also computes three altitude of the triangle. The height of a triangle is eventually referred as its altitude.

Code-

```
a,b,c=eval(input("Enter the sides "))
s=(a+b+c)/2
import math
area=math.sqrt(s*(s-a)*(s-b)*(s-c))
print("area = ", area)
```

```
a1=2*area/a
print("Three altitude of given triangle:", a1,end=",")
a2=2*area/b
print(a2,end=",")
a3=2*area/c
print(a3)
```

5. Write a Python program that accepts the lengths of three sides of a triangle as inputs. The program output should indicate whether the triangle is equilateral, isosceles or scalene triangle.

Code-

```
a,b,c=eval(input("Enter the sides "))
if a==b and b==c:
    print("Equilateral triangle")
elif a==b!=c or a==c!=b or b==c!=a :
    print("Isosceles triangle")
else:
    print ("Scalene triangle")
```

6. Write a Python a program that accepts a date as input and output the day of the week on which that date falls. Your program should accept three inputs: m (month), d (day), and y (year). For m use 1 for January, 2 for February, and so forth. For output write 0 for Sunday, 1 for Monday, 2 for Tuesday, and so forth. Use the following formulas, for the Gregorian calendar

Code-

```
m,d,y=eval(input("Enter mm,dd,yyyy "))
y0=y-(14-m)//12
x=y0+(y0//4)-(y0//100)+(y0//400)
m0 = m + 12 * ((14 - m) // 12) - 2
d0 = (d + x + (31*m0)// 12) % 7
print(d0)
```

7. Write a complete Python program to print the nature of the roots(real, imaginary, identical, single, complex etc.) and value(s) of the roots of the quadratic equation $ax^2 + bx + c = 0$. Your program should input the coefficients a, b and c from the user and then output the two roots. Your program must be able to take care of all possible values of a, b and c without running into a division by zero(if a is zero) or having to take the square root of a negative number, or if the discriminant is negative. Prints an appropriate error messages in such cases. Display imaginary/complex roots as a+ib.

Code-

```
import math
a,b,c=eval(input("Enter the coefficients "))
d=(b*b)-(4*a*c)
if a!=0:
    x1=(-b+ math.sqrt(d))/(2*a)
    x2=(-b- math.sqrt(d))/(2*a)
    if d>0:
        print("Real Roots")
        print("The first root " + str(x1))
        print("The second root " + str(x2))
    elif d==0:
        print("Single Root")
        print("Repeated Roots= " + str(x1))
    else:
        print(f"Complex Roots {a}+i{b}")
else:
    print("Invalid input")
```

8. Write a Python program that takes the annual salary (INR in Lakh) of a person as input and outputs the corresponding amount of income tax (INR in Lakh) to be paid by the person. The income tax is computed according to the following protocol:
If salary is upto 2.5 Lakh, no tax is to be charged.
If it is more than 2.5 Lakh but less than 5 Lakh, charge 5% of tax on whatever is in excess of 2.5 Lakh
If it is more than 5 Lakh but less than 10 Lakh, charge 20% on whatever is in excess of 5 Lakh in addition to the tax on 5 Lakh according to the previous rule.
If it is more than 10 Lakh, charge 30% on whatever is in excess of 10 Lakh in addition to the tax on 5 Lakh according to the previous rule.

Code-

```
sal=eval(input("Enter the salary in lakhs "))
sal*=100000
if sal>=0 and sal<=250000:
    amt=sal
elif sal>250000 and sal<=500000:
    amt=sal*0.05
elif sal>500000 and sal<1000000:
    amt=(250000*0.05)+(sal-500000)*0.2
else:
    amt=250000*0.05+(500000*0.2)+(sal-1000000)*0.3
print("Amount =" + str(amt/100000)+" lakhs")
```

9. Write a Python program that takes three numbers as input from the user and finds out whether one of the three numbers is the arithmetic mean of the other two.

Code-

```
a,b,c=eval(input("Enter the numbers "))
if a==(b+c)/2 :
    print(a," is the mean of ",b," and ",c)
elif b==(a+c)/2:
    print(b," is the mean of ",a," and ",c)
elif c==(a+b)/2:
    print(c," is the mean of ",a," and ",b)
else:
   print("No number is mean of the other two")
```

10. Write a Python program that takes three numbers as input from the user and finds out whether one of the three numbers is the arithmetic progression of the other two.

Code-

```
a,b,c=eval(input("Enter the numbers "))
if a-b==c-a or a-c==b-a:
    print(a,", ",b,", ",c," are in Arithmetic progression")
elif b-a==c-b or b-c==a-b:
```

```
    print(a,", ",b,", ",c," are in Arithmetic progression")
elif c-a==b-c or c-b==a-c:
    print(a,", ",b,", ",c," are in Arithmetic progression")
else:
   print(a,", ",b,", ",c," are not in Arithmetic progression")
```