3D TRANSFORMATIONS

AIM :

To implement 3D tranformations such as
1.Transilation
2.Scaling
3.Rotation
4.Reflection
5.Shear

PROGRAM :

```
import math
i=input("enter the number of co-ordinates")
j=[[0 for x in xrange(3)] for x in xrange(10)]
op=[[0 for x in xrange(3)] for x in xrange(10)]
for k in range(i):
   j[k]=raw_input("enter cordinates")
for k in range(i):
   j[k]=j[k].split(',')
print j[0]
for k in range(i):
   for l in range(3):
      j[k][l]=int(j[k][l])
print "\tCHOICE\n1.Transilation\n2.Scaling\n3.Rotation\n4.Reflection\n5.Shear"
n=input("Enter choice")
if n==1:
   tx=int(raw_input("enter x axis coefficient"))
   ty=int(raw_input("enter y axis coefficient"))
   tz=int(raw_input("enter z axis coefficient"))
   for k in range(i):
      op[k][0]=tx+j[k][0]
      op[k][1]=ty+j[k][1]
      op[k][2]=tz+j[k][2]
if n==2:
   tx=float(raw_input("enter x axis scaling factot"))
   ty=float(raw_input("enter y axis scaling factot"))
   tz=float(raw_input("enter z axis scaling factot"))
   for k in range(i):
      op[k][0]=float(tx*j[k][0])
      op[k][1]=float(ty*j[k][1])
      op[k][2]=float(tz*j[k][2])
if n==3:
   ang=int(raw_input("Enter thr angle"))
   ang=math.radians(ang)
   axis=int(raw_input("1 for x axis 2 for y axis 3 for z axis"))
   if axis==3:
      for k in range(i):
         op[k][0]=int((j[k][0]*math.cos(ang))-(j[k][1]*math.sin(ang)))
```

```
            op[k][1]=int((j[k][0]*math.sin(ang))+(j[k][1]*math.cos(ang)))
            op[k][2]=j[k][2]
    if axis==2:
        for k in range(i):
            op[k][0]=int((j[k][0]*math.cos(ang))-(j[k][2]*math.sin(ang)))
            op[k][2]=int((j[k][0]*math.sin(ang))+(j[k][2]*math.cos(ang)))
            op[k][1]=j[k][1]
    if axis==1:
        for k in range(i):
            op[k][1]=int((j[k][1]*math.cos(ang))-(j[k][2]*math.sin(ang)))
            op[k][2]=int((j[k][1]*math.sin(ang))+(j[k][2]*math.cos(ang)))
            op[k][0]=j[k][0]
if n==4:
    print "Choice\n 1.about xy plane \n 2.about yz plane\n 3.about xz plane"
    ch=input("enter choice")
    if ch==1:
        for k in range(i):
            op[k][0]=j[k][0]
            op[k][1]=j[k][1]
            op[k][2]=-j[k][2]
    if ch==2:
        for k in range(i):
            op[k][0]=-j[k][0]
            op[k][1]=j[k][1]
            op[k][2]=j[k][2]
    if ch==3:
        for k in range(i):
            op[k][0]=j[k][0]
            op[k][1]=-j[k][1]
            op[k][2]=j[k][2]
if n==5:
    if i<3:
        print "minimum number of co-ordinates is 3"
    else:
        print "Choice\n 1.about x axis \n 2.about y axis\n 3.about z axis"
        ch=input("enter choice")
        if ch==1:
            a=input("enter a")
            b=input("enter b")
            for k in range(i):
                op[k][0]=j[k][0]
                op[k][1]=int(j[k][1]+(j[k][0]*a))
                op[k][2]=int(j[k][2]+(j[k][0]*b))
        if ch==2:
            a=input("enter a")
            b=input("enter b")
            for k in range(i):
                op[k][1]=j[k][1]
                op[k][2]=int(j[k][2]+(j[k][1]*a))
                op[k][0]=int(j[k][0]+(j[k][1]*b))
        if ch==3:
            a=input("enter a")
```

```
        b=input("enter b")
        for k in range(i):
            op[k][2]=j[k][2]
            op[k][1]=int(j[k][1]+(j[k][2]*a))
            op[k][0]=int(j[k][0]+(j[k][2]*b))

print "The out put cordinates are\n"
for k in range(i):
    print op[k],"\n"
```

OUTPUT :

Transilation :

```
enter the number of co-ordinates  3
enter cordinates  2,3,4
enter cordinates  5,6,7
enter cordinates  6,7,8
['2', '3', '4']

        CHOICE
1.Transilation
2.Scaling
3.Rotation
4.Reflection
5.Shear

Enter choice  1
enter x axis coefficient  2
enter y axis coefficient  3
enter z axis coefficient  2

The out put cordinates are  :   [4, 6, 6]      [7, 9, 9]      [8, 10, 10]
```

Scaling :

```
enter the number of co-ordinates  3
enter cordinates  2,3,4
enter cordinates  5,6,7
enter cordinates  6,7,8
['2', '3', '4']

        CHOICE
1.Transilation
2.Scaling
3.Rotation
4.Reflection
5.Shear

Enter choice  2
```

enter x axis scaling factot 2
enter y axis scaling factot 3
enter z axis scaling factot 2
The out put cordinates are : [4.0, 9.0, 8.0] [10.0, 18.0, 14.0] [12.0, 21.0, 16.0]

Rotation :

enter the number of co-ordinates 3
enter cordinates 2,3,4
enter cordinates 5,6,7
enter cordinates 6,7,8
['2', '3', '4']
CHOICE

1.Transilation
2.Scaling
3.Rotation
4.Reflection
5.Shear
Enter choice 3
Enter thr angle 90
1 for x axis 2 for y axis 3 for z axis 1
The out put cordinates are : [2, -4, 3] [5, -7, 6] [6, -8, 7]

Reflection :

enter the number of co-ordinates 3
enter cordinates 2,3,4
enter cordinates 5,6,7

enter cordinates 6,7,8
['2', '3', '4']
CHOICE
1.Transilation
2.Scaling
3.Rotation
4.Reflection
5.Shear
Enter choice 4
Choice
 1.about xy plane
 2.about yz plane
 3.about xz plane
enter choice 1
The out put cordinates are : [2, 3, -4] [5, 6, -7] [6, 7, -8]
---
enter the number of co-ordinates3
enter cordinates 2,3,4
enter cordinates 5,6,7
enter cordinates 6,7,8
['2', '3', '4']

```
        CHOICE
1.Transilation
2.Scaling
3.Rotation
4.Reflection
5.Shear
Enter choice  4

Choice
 1.about xy plane
 2.about yz plane
 3.about xz plane
enter choice    2
The out put cordinates are   [-2, 3, 4]     [-5, 6, 7]      [-6, 7, 8]
.....


enter the number of co-ordinates  3
enter cordinates   2,3,4
enter cordinates   5,6,7
enter cordinates   6,7,8
['2', '3', '4']
        CHOICE
1.Transilation
2.Scaling
3.Rotation
4.Reflection
5.Shear
Enter choice   4

Choice
 1.about xy plane
 2.about yz plane
 3.about xz plane
enter choice  3
The out put cordinates are  :   [2, -3, 4]     [5, -6, 7]     [6, -7, 8]
```

Shear :

```
enter the number of co-ordinates3
enter cordinates   2,3,4
enter cordinates   5,6,7
enter cordinates   6,7,8
['2', '3', '4']
        CHOICE
1.Transilation
2.Scaling
3.Rotation
4.Reflection
5.Shear
```

```
Enter choice  5
Choice
 1.about x axis
 2.about y axis
 3.about z axis
enter choice  1
enter a  3
enter b  4
The out put cordinates are  :  [2, 9, 12]     [5, 21, 27]     [6, 25, 32]
.....................................................................
enter the number of co-ordinates  3
enter cordinates   2,3,4
enter cordinates   5,6,7
enter cordinates   6,7,8
['2', '3', '4']
          CHOICE
1.Transilation
2.Scaling
3.Rotation
4.Reflection
5.Shear
Enter choice   5
Choice
 1.about x axis
 2.about y axis
 3.about z axis
enter choice   2
enter a  4
enter b  5
The out put cordinates are  :  [17, 3, 16]     [35, 6, 31]      [41, 7, 36]
.....................................................................
enter the number of co-ordinates  3
enter cordinates   2,3,4
enter cordinates   5,6,7
enter cordinates   6,7,8
['2', '3', '4']
          CHOICE
1.Transilation
2.Scaling
3.Rotation
4.Reflection
5.Shear
Enter choice   5
Choice
 1.about x axis
 2.about y axis
 3.about z axis
enter choice   3
enter a   4
enter b   5
The out put cordinates are  [22, 19, 4]     [40, 34, 7]      [46, 39, 8]
```