EXPERIMENT 1

AIM

1. Write a program to calculate the nth-root of a complex number. Moreover, plot all the roots for the test examples
   - $\sqrt[3]{8\iota}$,
   - $\sqrt[n]{-7+24\iota}$; $n = 2, 3, 4$ and
   - $\sqrt[n]{1}$; $n = 2, 3, \ldots 10$

   where $\iota = \sqrt{-1}$.

NAME: Nitya Mittal (2k19/MC/089) , DATE:30/08/2020

THEORY:

So if $z = r(\cos\theta + i\sin\theta)$ *then the* n^{th} *roots of* z *are given by* $r^{1/n}\left(\cos\left(\frac{\theta+2k\pi}{n}\right)+i\sin\left(\frac{\theta+2k\pi}{n}\right)\right)$.

SOURCE CODE

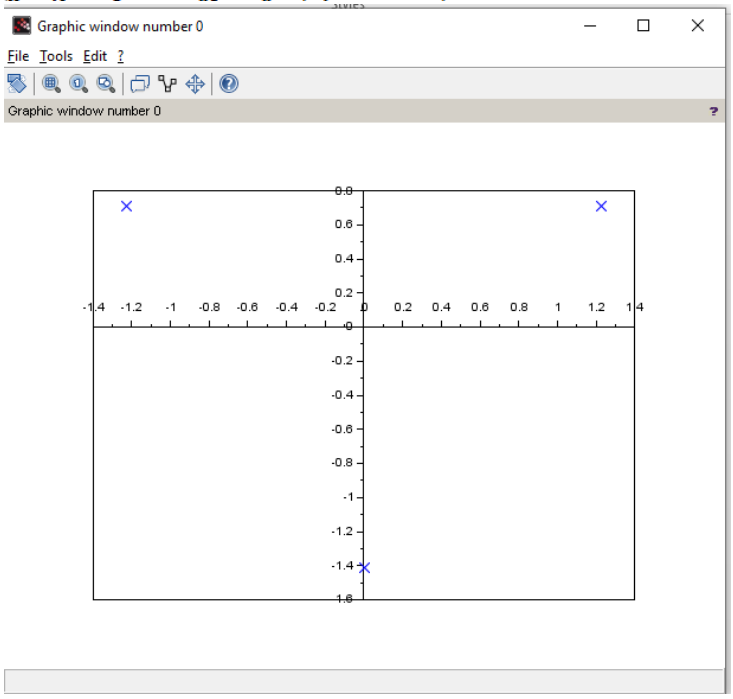
```
clear
x=input("Enter the Real Part of the Number ")
y=input("Enter the Imaginary Part of the Number ")

z=complex(x,y)

n=input("Enter the value of n ")

r=abs(z)

arg=acos(x/r)

nr=nthroot(r,n)

for i=0:n-1
   alphaval(i+1)=(arg+(2*%pi*i))/n;
end
```

```
disp("The roots of the given number")

for i=1:n
   fnum(i)=complex(nr*cos(alphaval(i)),nr*sin(alphaval(i)))
   disp(fnum(i))

end

for i=1:n
   plot(real(fnum(i)),imag(fnum(i)),'x')
end
```

OUTPUT:

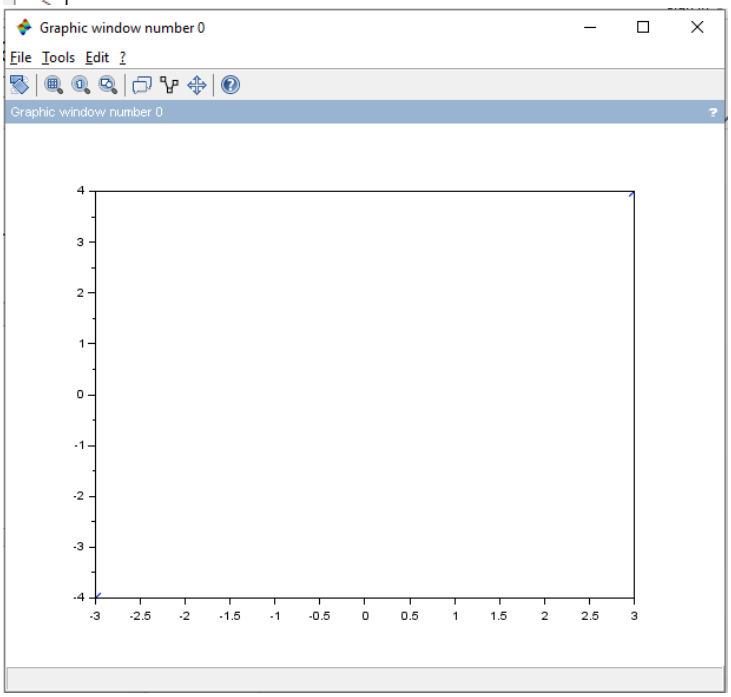
1) z=8i, n=3

```
Enter the Real Part of the Number 0

Enter the Imaginary Part of the Number 2.8284

Enter the value of n 3


  "The roots of the given number"

   1.224741 + 0.7071045i

  -1.224741 + 0.7071045i

   0. - 1.414209i
 ged_handle  =
```

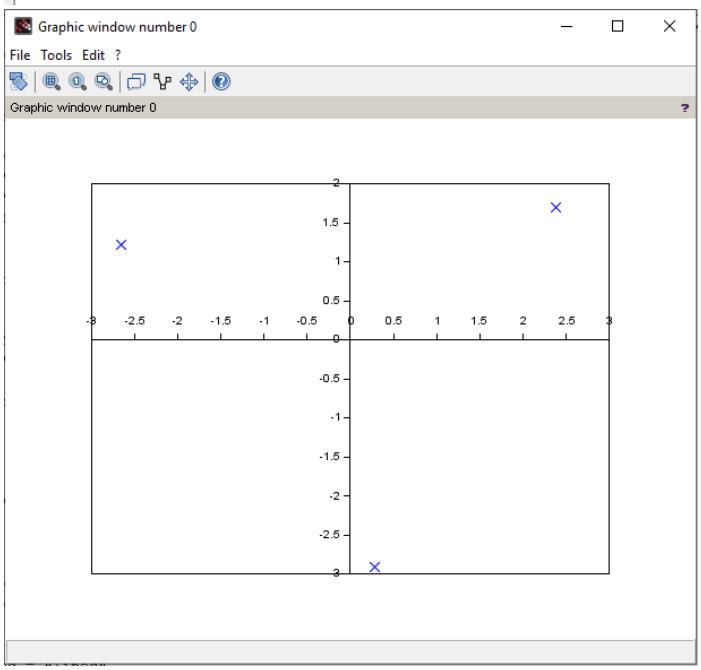


2) z=-7+24i, n=2,3,4

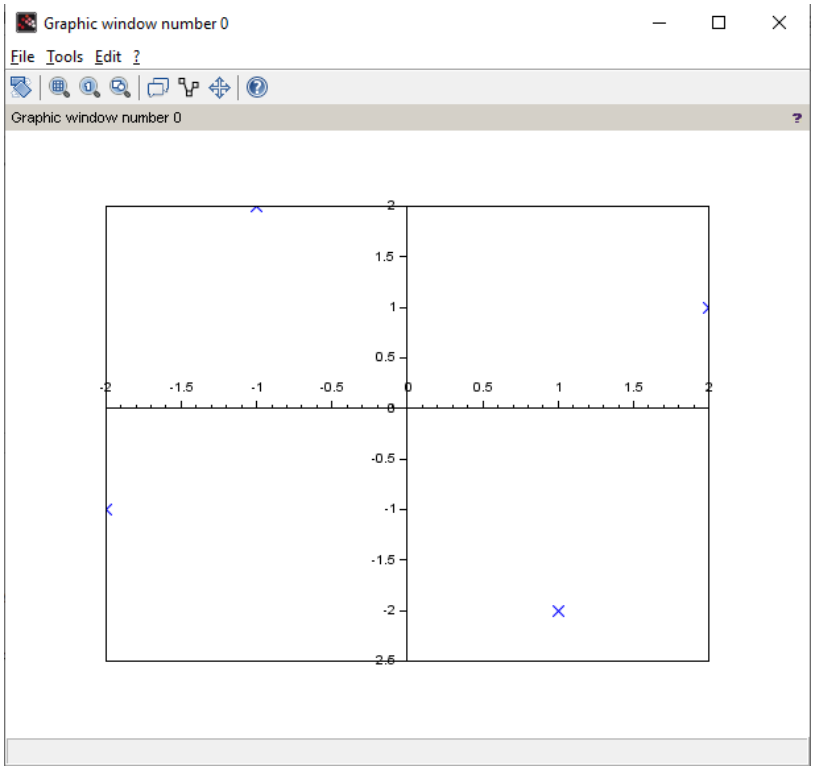
```
Enter the Real Part of the Number -7

Enter the Imaginary Part of the Number 24

Enter the value of n 2


  "The roots of the given number"

   3. + 4.i

  -3. - 4.i
```



```
Enter the Real Part of the Number -7

Enter the Imaginary Part of the Number 24

Enter the value of n 3


  "The roots of the given number"

   2.3828547 + 1.6946631i

  -2.6590487 + 1.2162811i

   0.276194 - 2.9109443i
```

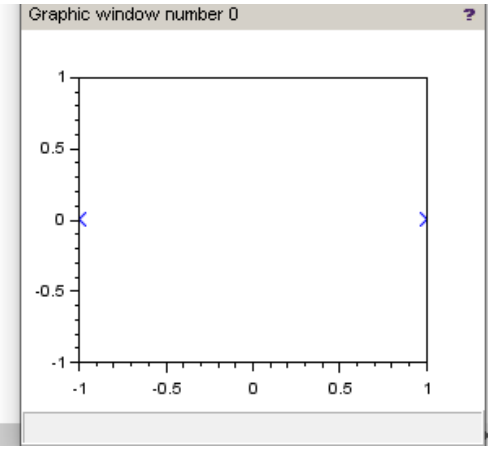


```
--> exec('C:\Users\Manoj\Desktop\DTU\Maths 3\nth root.sce', -1)
Enter the Real Part of the Number -7

Enter the Imaginary Part of the Number 24

Enter the value of n 4


  "The roots of the given number"

   2. + 1.i

  -1. + 2.i

  -2. - 1.i

   1. - 2.i

-->
```

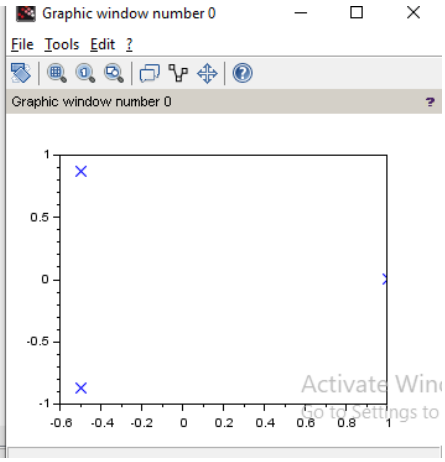


3) z=1, n=2,3….10

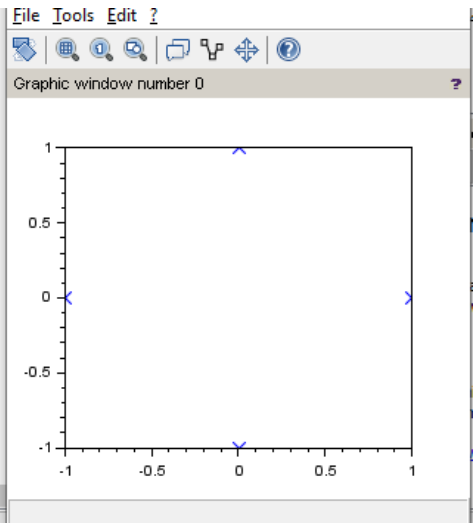
```
  "Enter the Real Part of the Number   1"

  "Enter the Imaginary Part of the Number   0"
Enter the value of n 2


  "The roots of the given number"

   1.

  -1.

-->
```



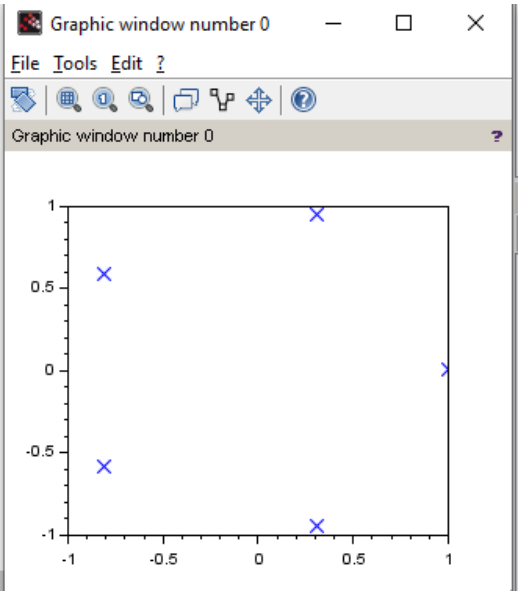

```
  -i.

--> exec('C:\Users      \Desktop\    Maths 3\nth root.sce', -1)

  "Enter the Real Part of the Number   1"

  "Enter the Imaginary Part of the Number   0"
Enter the value of n 3


  "The roots of the given number"

   1.

  -0.5 + 0.8660254i

  -0.5 - 0.8660254i

-->
```



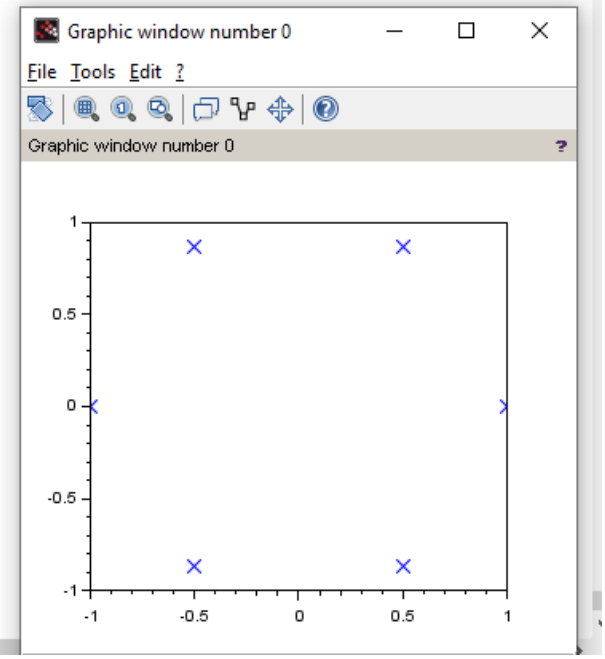

```
  "Enter the Real Part of the Number   1"

  "Enter the Imaginary Part of the Number   0"
Enter the value of n 4


  "The roots of the given number"

   1.

   0. + i

  -1.

   0. - i

-->
```



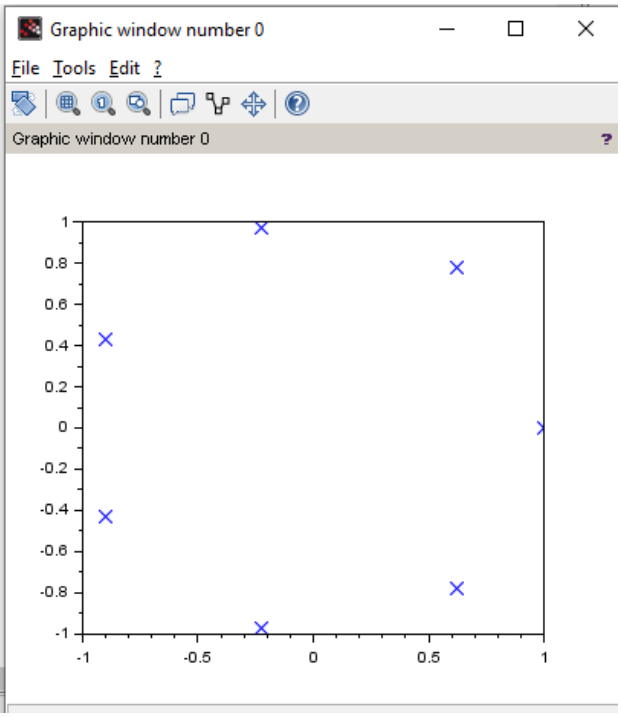
```
  "Enter the Real Part of the Number   1"

  "Enter the Imaginary Part of the Number   0"
Enter the value of n 5


  "The roots of the given number"

   1.

   0.309017 + 0.9510565i

  -0.809017 + 0.5877853i

  -0.809017 - 0.5877853i

   0.309017 - 0.9510565i

-->
```



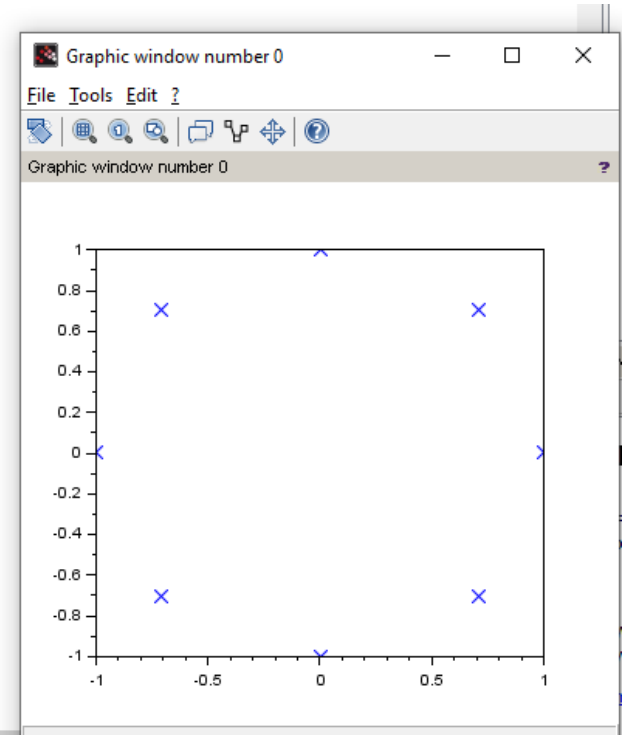

```
  "Enter the Real Part of the Number   1"

  "Enter the Imaginary Part of the Number   0"
Enter the value of n 6


  "The roots of the given number"

   1.

   0.5 + 0.8660254i

  -0.5 + 0.8660254i

  -1.

  -0.5 - 0.8660254i

   0.5 - 0.8660254i

-->
```



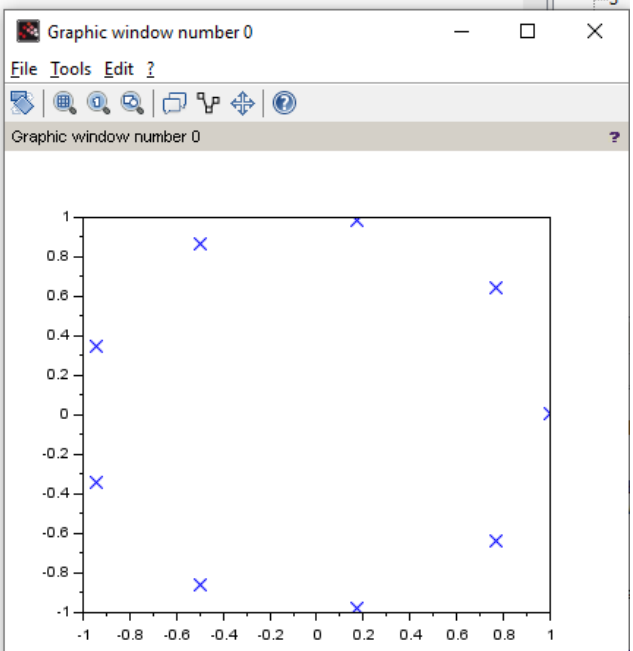
```
  "Enter the Real Part of the Number   1"

  "Enter the Imaginary Part of the Number   0"
Enter the value of n 7


  "The roots of the given number"

   1.

   0.6234898 + 0.7818315i

  -0.2225209 + 0.9749279i

  -0.9009689 + 0.4338837i

  -0.9009689 - 0.4338837i

  -0.2225209 - 0.9749279i

   0.6234898 - 0.7818315i

-->
```




```
  "Enter the Real Part of the Number   1"

  "Enter the Imaginary Part of the Number   0"
Enter the value of n 8


  "The roots of the given number"

   1.

   0.7071068 + 0.7071068i

   0. + i

  -0.7071068 + 0.7071068i

  -1.

  -0.7071068 - 0.7071068i

   0. - i

   0.7071068 - 0.7071068i

-->
```



```
  "Enter the Real Part of the Number   1"

  "Enter the Imaginary Part of the Number   0"
Enter the value of n 9


  "The roots of the given number"

   1.

   0.7660444 + 0.6427876i

   0.1736482 + 0.9848078i

  -0.5 + 0.8660254i

  -0.9396926 + 0.3420201i

  -0.9396926 - 0.3420201i

  -0.5 - 0.8660254i

   0.1736482 - 0.9848078i

   0.7660444 - 0.6427876i

-->
```




```
  "Enter the Real Part of the Number   1"

  "Enter the Imaginary Part of the Number   0"
Enter the value of n 10


  "The roots of the given number"

   1.

   0.809017 + 0.5877853i

   0.309017 + 0.9510565i

  -0.309017 + 0.9510565i

  -0.809017 + 0.5877853i

  -1.

  -0.809017 - 0.5877853i

  -0.309017 - 0.9510565i

   0.309017 - 0.9510565i

   0.809017 - 0.5877853i

-->
```