MATH206 Homework1Solutions

1.

a. 0.9473π

b. -0.1959π

c. -0.8701π

```
function argz = ArgZ(z1,z2,op)

argz1 = 180*(angle(z1)/pi);
argz2 = 180*(angle(z2)/pi);

if op == 1  % multiplication
    argz = argz1 + argz2;
else        % division
    argz = argz1 - argz2;
end

if argz > 180 && argz < 360
    argz = argz - 360;
end

if argz > 360
    argz = mod(argz,360);
end

argz = argz/180; % convert to radians
```

2.

a.

solve(z^3-(1-2i)*z^2-(21+25i)*z-(124+32i))

ans =

-4-5*i

7+i

-2+2*i

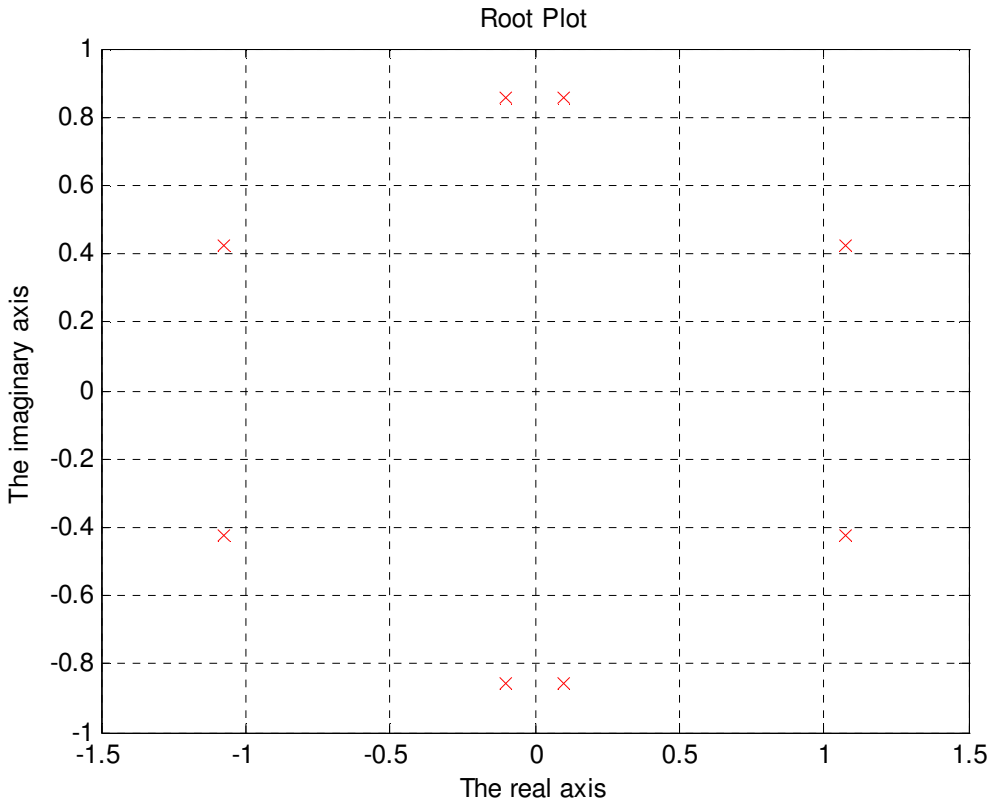
b.

root = roots([2 0 -1 0 -1 0 3 0 2])

plot(root,'rx','MarkerSize',7)

grid

```
title('Root Plot')
xlabel('The real axis')
ylabel('The imaginary axis')
root =
  -1.0755 + 0.4232i
  -1.0755 - 0.4232i
   1.0755 + 0.4232i
   1.0755 - 0.4232i
  -0.1029 + 0.8591i
  -0.1029 - 0.8591i
   0.1029 + 0.8591i
   0.1029 - 0.8591i
```

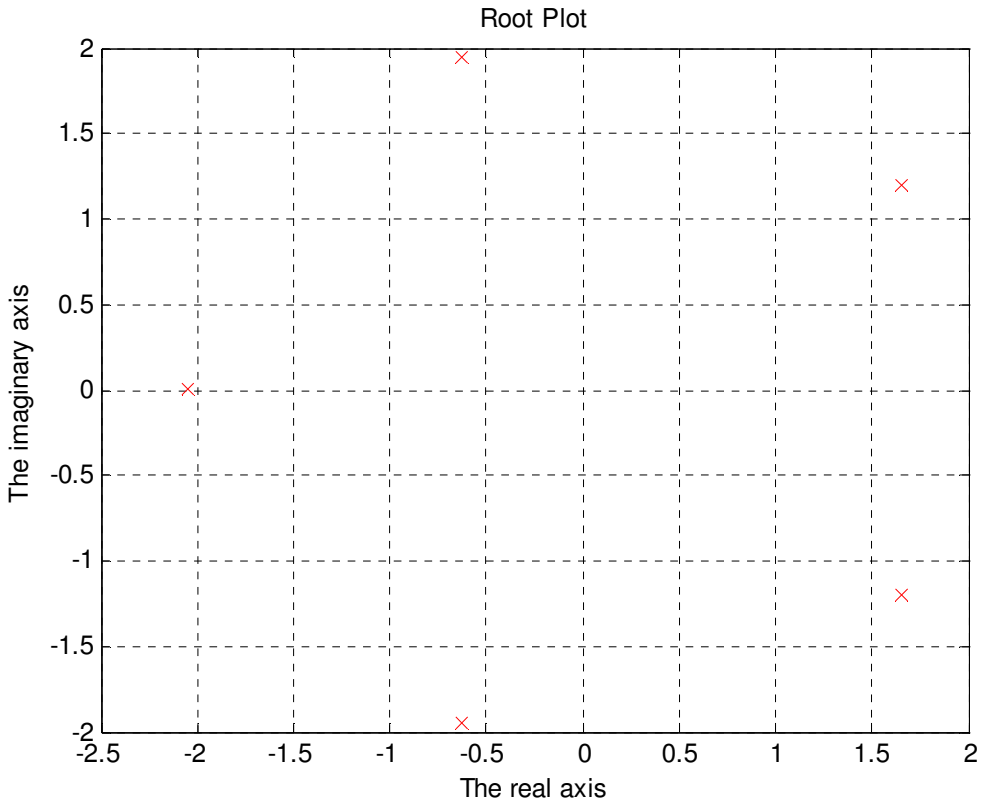


3.

```
function allroots = FindRoots(z0,n)
P_Zo = phase(z0);
Ab_Zo = abs(z0);
allroots = zeros(1,n);
for k = 0:n-1,
    allroots(k+1) = (Ab_Zo^(1/n))*exp(i*(P_Zo+2*pi*k)/n);
end
figure
plot(allroots,'rx','MarkerSize',7)
grid on
title('Root Plot')
xlabel('The real axis')
ylabel('The imaginary axis')
```

a.

```
>> FindRoots(-36,5)
ans =
  1.6566 + 1.2036i  -0.6328 + 1.9475i  -2.0477 + 0.0000i  -0.6328 - 1.9475i   1.6566 - 1.2036i
```

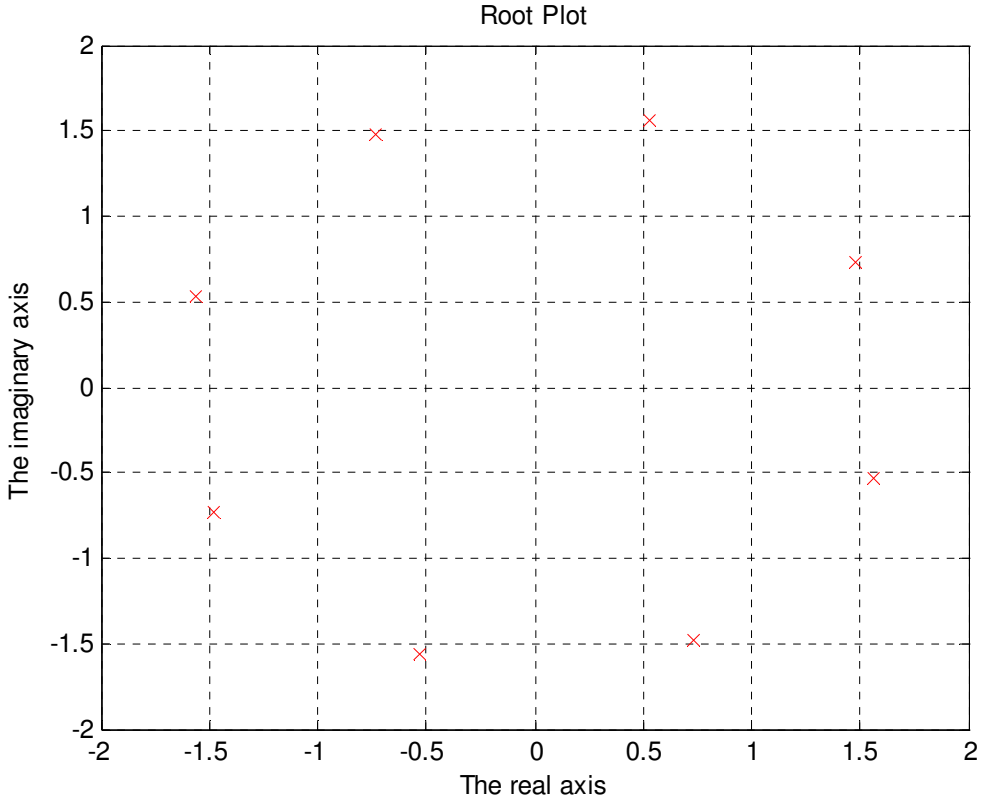


b.

```
FindRoots(-27*sqrt(3)-i*27,8)
ans =
  Columns 1 through 5
   1.5591 - 0.5292i   1.4767 + 0.7282i   0.5292 + 1.5591i  -0.7282 + 1.4767i  -1.5591 + 0.5292i
```

Columns 6 through 8

-1.4767 - 0.7282i -0.5292 - 1.5591i   0.7282 - 1.4767i



4.

```
clear all;close all;clc

% assume our complex region is defined by z = x + i*y

l = 0;
for x = 0:0.01:1,
    for y = -2*x:0.01:2*x,
        l = l+1;
        z(l) = x+i*y;
    end
end

w = exp(z);
% w = sin(z);

subplot(1,2,1)
plot(z)
grid on
xlabel('The real axis')
ylabel('The imaginary axis')
title('The input region')
```

```
subplot(1,2,2)
plot(w)
grid on
xlabel('The real axis')
ylabel('The imaginary axis')
title('The transformed region')
```

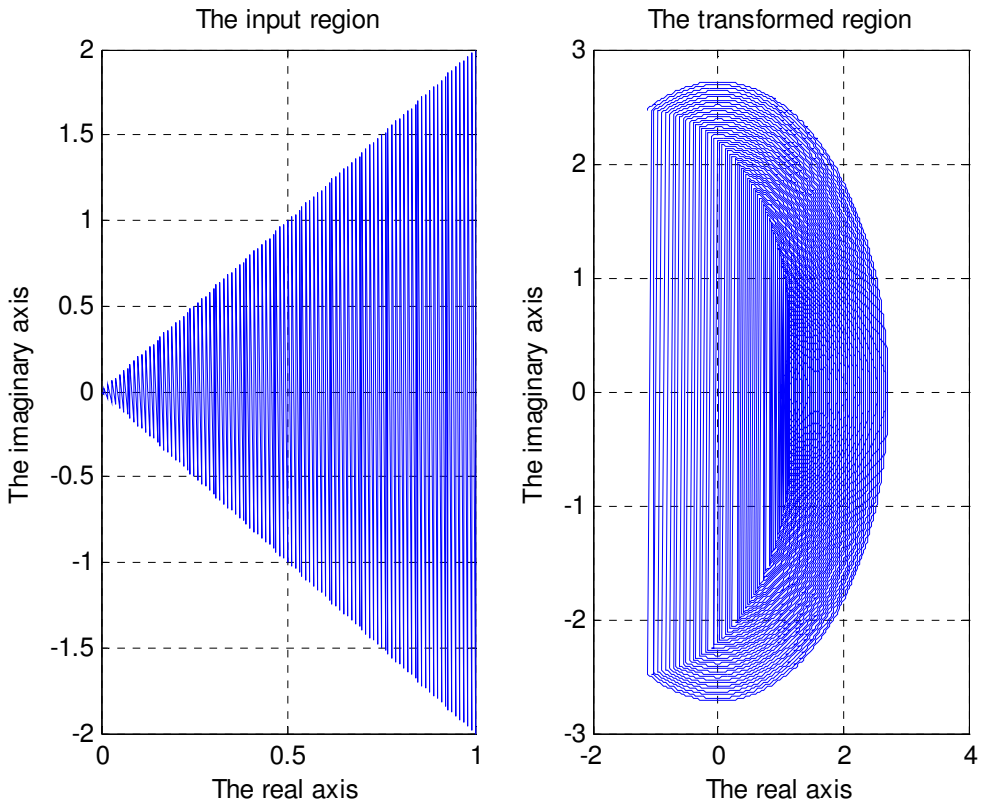


Figure 1. $w = \exp(z)$

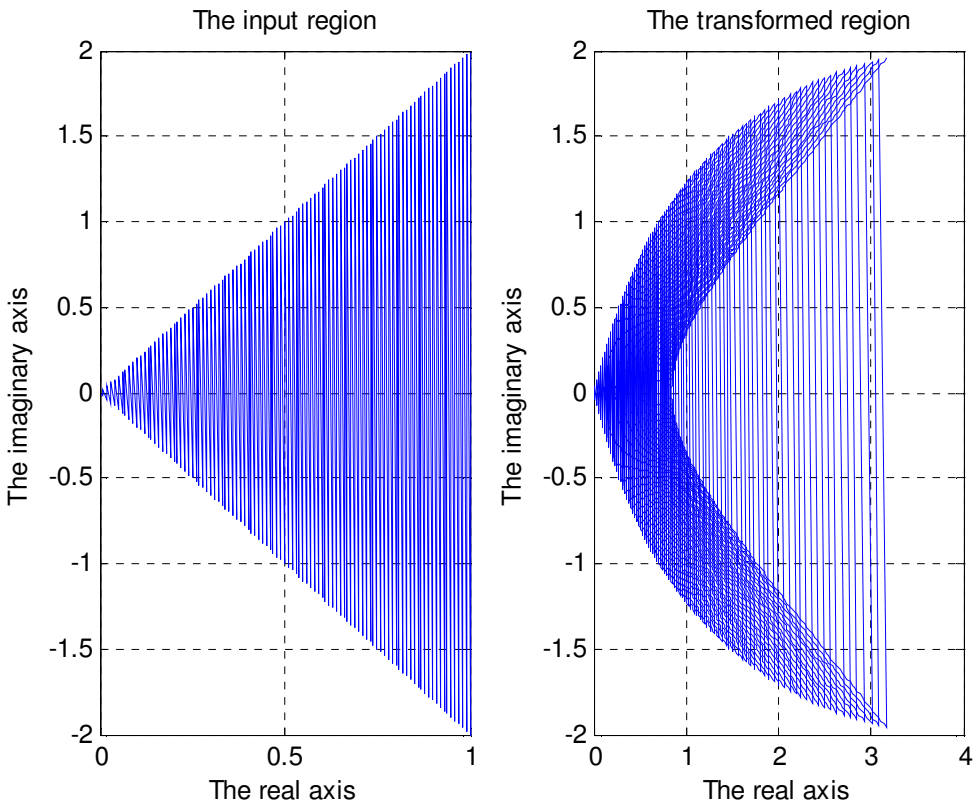


Figure 2. $w = \sin(z)$