# Problem Set A
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Math 308-510
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## Problem 1

```
% a)
A1 = 413/(768+295);
fprintf('a)\n\t %.2f\n\n',A1)

% b)
fprintf('b)\n\t%.2e\n',2^(123))
fprintf('\t%.0f\n\n',2^(123))

% c)
fprintf('c)\n\t%1.34f\n',pi^2)
fprintf('\t%1.34f\n\n',exp(1))

% d)
val = [61/88 13863/20000 253/365];
ln2 = log(2);
small = val(1);
temp = ln2 + val(1);
fprintf('d)\n')
for i = 1:3
    fprintf('\t%f\n',val(i))
    if abs(val(i) - ln2) < temp
        small = val(i);
    end
end
fprintf('\tBest approx = %f which is 253/365 \n\n',small)
```

```
a)
         0.39

b)
        1.06e+37
        10633823966279326983230456482242756608

c)
        9.8696044010893579923049401259049773
        2.7182818284590455348848081484902650

d)
        0.693182
```

```
0.693150
0.693151
Best approx = 0.693151 which is 253/365
```

## Problem 2

```
a = 1;
prob = ['a', 'b', 'c'];
for i = 1:3
    val = sin(a/(10^i))/(a/10^i);
    fprintf('%s)\n\t %.15f\n',prob(i),val)
end
```

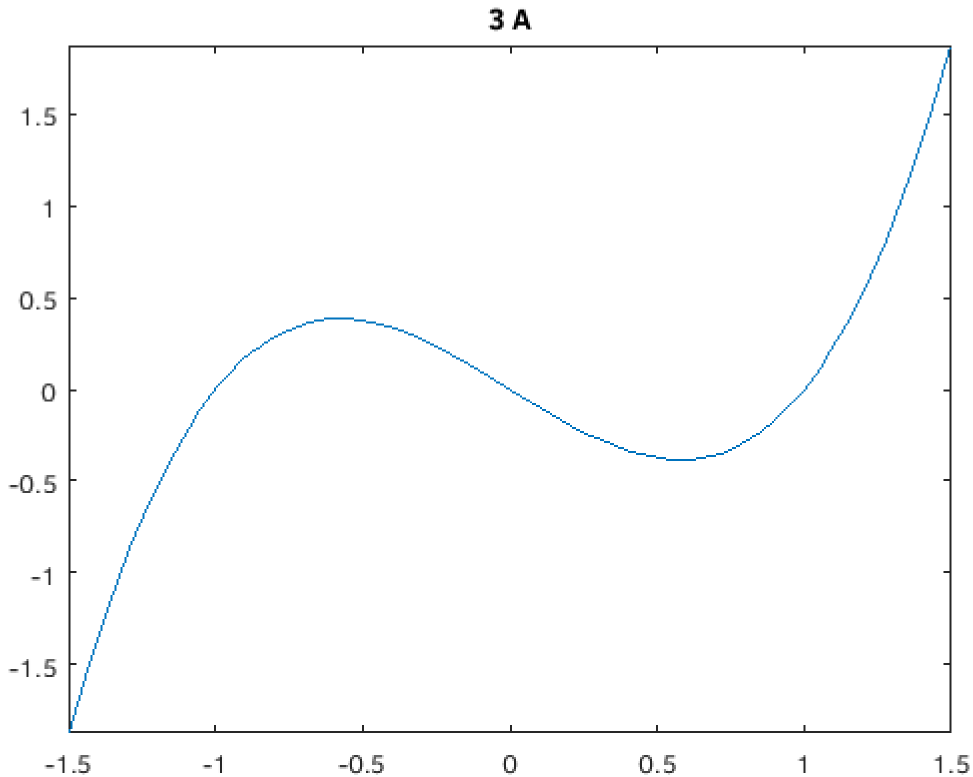
```
a)
         0.998334166468282
b)
         0.999983333416666
c)
         0.999999833333342
```

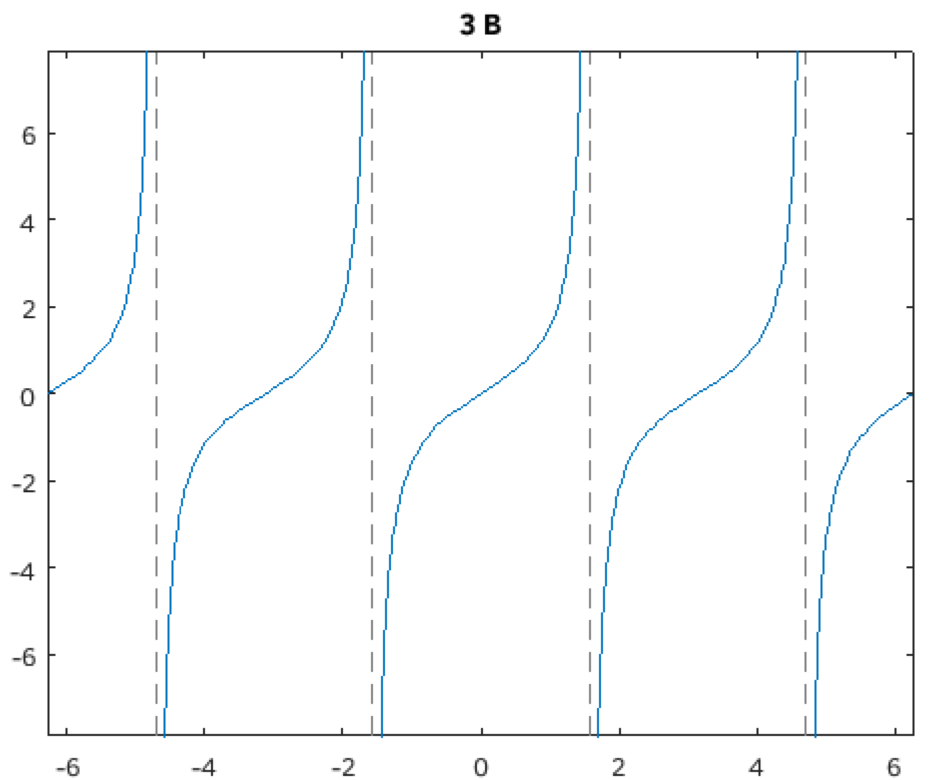
## Problem 3

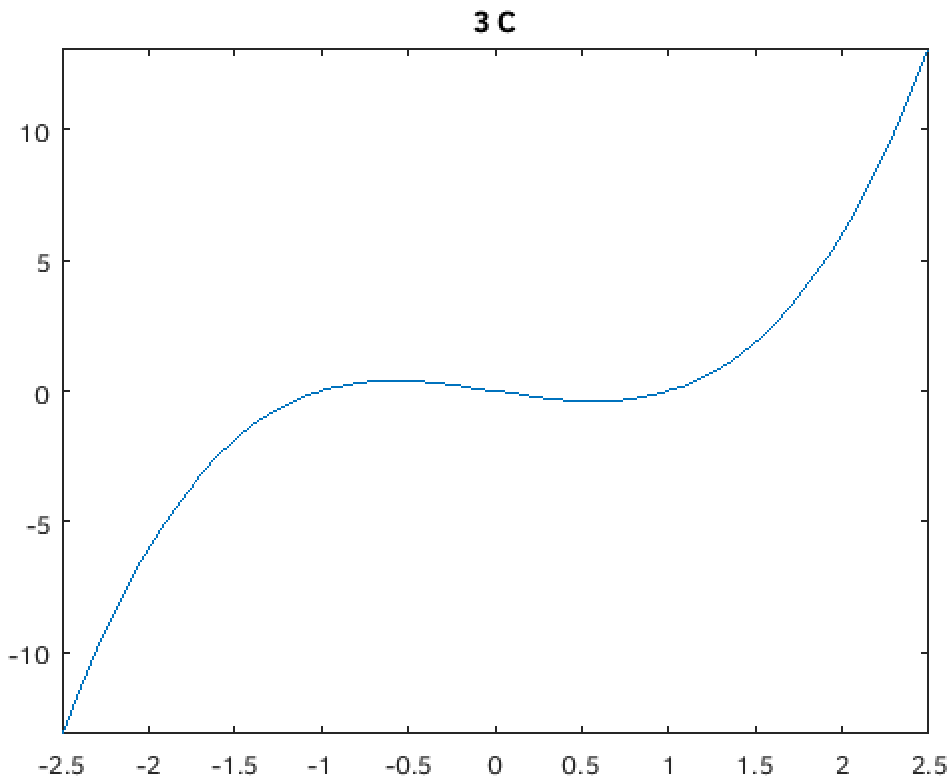
```
% a
fplot(@(x) x.^3-x,[-1.5 1.5])
title('3 A')
figure

% b
fplot(@(x) tan(x),[-2*pi 2*pi])
title('3 B')
figure

% c
fplot(@(x) x.^3-x,[-2.5 2.5])
title('3 C')
```


3 A
1.5
1
0.5
0
-0.5
-1
-1.5
-1.5
-1
-0.5
0
0.5
1
1.5


3 B
6
4
2
0
-2
-4
-6
-6
-4
-2
0
2
4
6

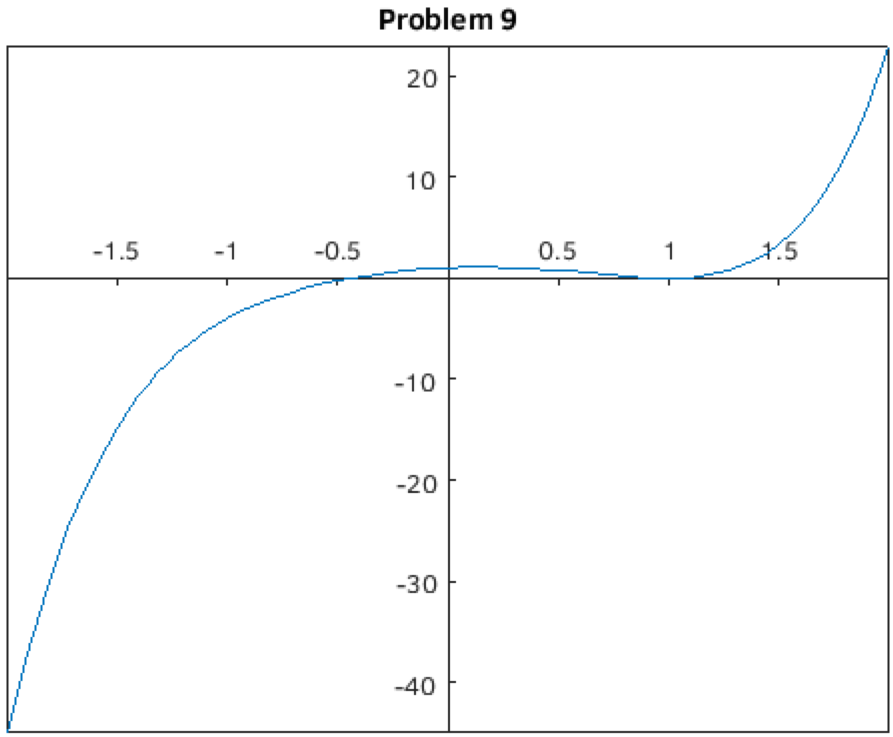



## Problem 9

```
figure
fplot(@(x) x.^5 - 3*x.^2 + x + 1,[-2 2])
syms x
solve(x^5 - 3*x^2 + x + 1 == 0,x)
title('Problem 9')
ax = gca;
ax.XAxisLocation = 'origin';
ax.YAxisLocation = 'origin';
```

```
ans =

                                 1
                                 1
 root(z^3 + 2*z^2 + 3*z + 1, z, 1)
 root(z^3 + 2*z^2 + 3*z + 1, z, 2)
 root(z^3 + 2*z^2 + 3*z + 1, z, 3)
```



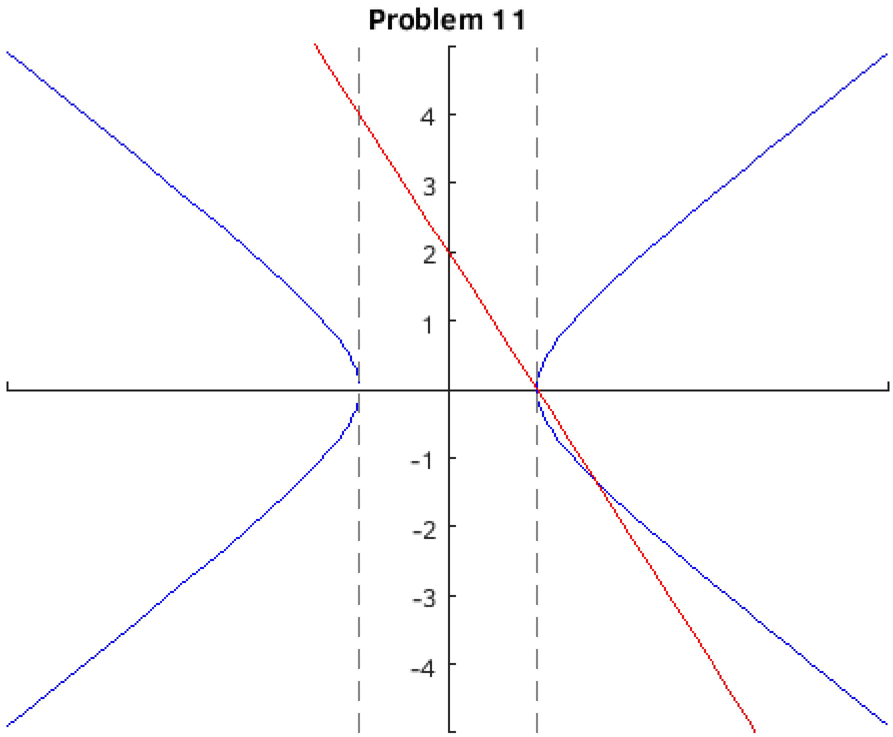

This solution has two real roots and 3 complex roots. This is the reason for five total roots.

## Problem 11

```
syms x y
e1 = x^2 - y^2 == 1;
e2 = 2*x+y == 2;
sol = solve([e1, e2], [x,y]);
fprintf('(%.2f, %.2f) and (%.2f, %.2f)\n',sol.x(1),sol.y(1),sol.x(2),sol.y(2))

figure
axis([-5 5 -5 5])
hold on
fplot(@(x) sqrt(x.^2-1),'b')
fplot(@(x) -sqrt(x.^2-1),'b')
fplot(@(x) -2*x +2,'r')
title('Problem 11')
ax = gca;
ax.XAxisLocation = 'origin';
ax.YAxisLocation = 'origin';
```

```
(1.00, 0.00) and (1.67, -1.33)
```


Problem 11
4
3
2
1
-1
-2
-3
-4