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```
function sub3

tol = 10^-5;
```

Question1Ai)

```
f = @(x) (exp(x) + 2.^-x + 2*cos(x) -6);
I0 = [1,2];
[rootB1,iterationcountB1] = bisectionSearch(f,tol,I0);
[rootF1,iterationcountF1] = RegularfalsiSearch(f,tol,I0);

F=@(x)(exp(x) + 2.^-x + 2*cos(x) -6);
Fprime = @(x)(exp(x) - 2.^-x - 2*sin(x));
x0 = 1;
[rootN1,iterationcountN1] = Newtonmethodscalar(F,Fprime,x0,tol);
 disp('     ')
disp('Question1ai)')
disp('     ')
fprintf('%5s %5s %15s\n', '          Method   ','   root    ', '
 Iteration count')
fprintf('%50s\n','_____________________________________________') %after
 decimal point is how many decimal to include, letter is type, before
 decimal is field width
fprintf('%50s\n','                                             ')
fprintf('%15s %6.5f %4s %2i\n' ,  '        Bisection    ',rootB1,'
 ',iterationcountB1)
fprintf('%15s %6.5f %4s %2i\n' ,  '       False position',rootF1,'
 ',iterationcountF1)
fprintf('%15s %6.5f %4s %2i\n' ,  '         Newton      ',rootN1,'
 ',iterationcountN1)
```

Question1ai)

Method	root	Iteration count
Bisection	1.82938	15
False position	1.82938	5

```
Newton       1.82938       8
```

Question1Aii)

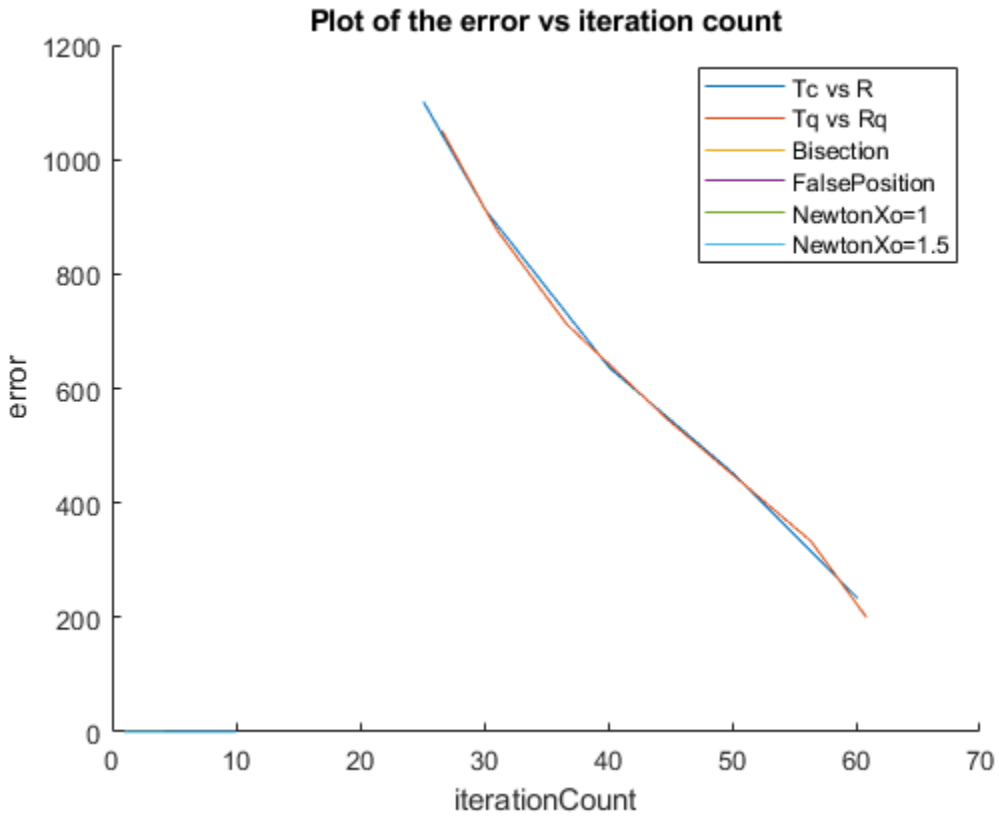
```
f = @(x) (1-(2/(x.^2 -2*x +2)));
I0 = [-1,1];
[rootB2,iterationcountB2] = bisectionSearch(f,tol,I0);
[rootF2,iterationcountF2] = RegularfalsiSearch(f,tol,I0);

F=@(x) (1-(2/(x.^2 -2*x +2)));
Fprime = @(x)((2/((x.^2 -2*x +2).^2))*(2*x -2));
x0 = 0.5;
[rootN2,iterationcountN2] = Newtonmethodscalar(F,Fprime,x0,tol);
  disp('     ')
disp('Question1aii)')
disp('     ')
fprintf('%5s %5s %15s\n', '          Method   ','   root    ', '
 Iteration count')
fprintf('%50s\n','_____________________________________________')
fprintf('%50s\n','                                             ')
fprintf('%15s %6.5f %4s %2i\n' ,  '        Bisection    ',rootB2,'
 ',iterationcountB2)
fprintf('%15s %6.5f %4s %2i\n' ,  '       False position',rootF2,'
 ',iterationcountF2)
fprintf('%15s %6.5f %4s %2i\n' ,  '         Newton      ',rootN2,'
 ',iterationcountN2)
```

```
Question1aii)

          Method       root       Iteration count
        _____________________________________________

        Bisection     -0.00001      16
       False position -0.00000       6
        Newton       0.00000       3
```

Question1aiii)

```
f = @(x) (exp(x) + 2.^-x + 2*cos(x) -6);
F=@(x)(exp(x) + 2.^-x + 2*cos(x) -6);
Fprime = @(x)(exp(x) - 2.^-x - 2*sin(x));
x0=1;
I0 = [1,2];

 disp('     ')
disp('Question1aiii) (graph on next page)')
disp('     ')
plotting(f,tol,I0,F,Fprime,x0)
```

```
Question1aiii) (graph on next page)
```



Question1b)

```
disp('     ')
disp('Question1b)')
disp('     ')

f = @(x) (x - (tan(x)));
I0 = [0,2];
[rootB1,iterationcountB1] = bisectionSearch(f,tol,I0);
I0 = [2,5];
[rootB2,iterationcountB1] = bisectionSearch(f,tol,I0);
I0 = [5,8];
[rootB3,iterationcountB1] = bisectionSearch(f,tol,I0);
I0 = [7,10];
[rootB4,iterationcountB1] = bisectionSearch(f,tol,I0);

disp('Using the Bisection method, the roots are ')
disp(rootB1); disp( rootB2); disp( rootB3);
```

```
Question1b)

Using the Bisection method, the roots are
   7.6294e-06
```

```
    4.4934

    7.7253
```

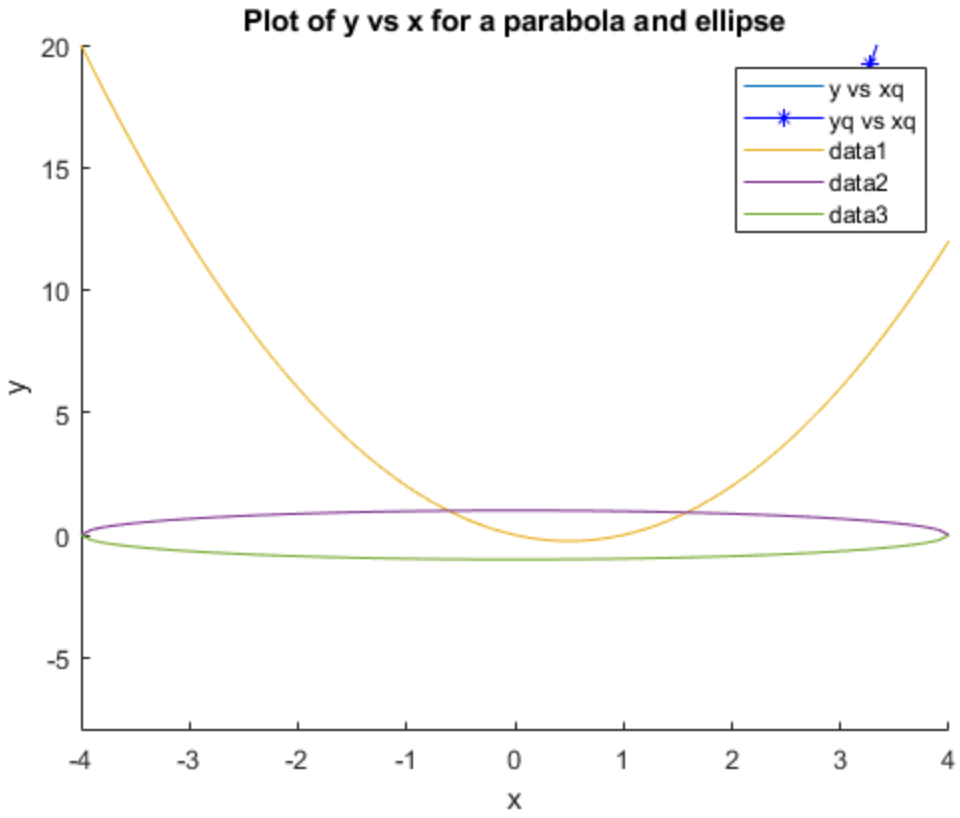
Question2a)

```
disp('     ')
disp('%%Question2a)')
disp('     ')
tol = 10^-5;
x0 = [1;1;1];
F =@(x,y,z)[(sin(x)+y.^2+log(z)-7);(3*x+2.^y-z.^3+1);(x+y+z-5)];
 J = @(x,y,z)[cos(x), 2*y , 1/z; 3, log(2)*2.^y, -3*z.^2; 1, 1, 1];
 root= Newtonmethodsystem(F,J,x0,tol);
 disp('The root is   ')
disp(root)


%%Question2a)

The root is
    0.5991
    2.3959
```

Question2b)

```
disp('     ')
disp('%%Question2b)')
disp('     ')
F = @(x,y)[(x.^3 - 3*x*y.^2 -1); (3*x.^2*y - y.^3)];
J = @(x,y)[(3*x.^2 - 3*y.^2), -6*x*y; 6*x*y,(3*x.^2 - 3*y.^2)];
x0 = [-0.6;0.6];
root= Newtonmethodsystem(F,J,x0,tol);
disp('The root is   ')
disp(root)

%%Question2c)
disp('     ')
disp('%%Question2c)')
disp('     ')
F = @(x,y)[(y - x.^2 +x); (x.^2/16 + y.^2 -1)];
J = @(x,y)[(-2*x +1), 1; x/8 , 2*y];
x0 = [-2;4]

root1 = Newtonmethodsystem(F,J,x0,tol);
x0 = [2;3]
root2 = Newtonmethodsystem(F,J,x0,tol);
disp('The roots are   ')
```

```
disp(root1)
disp ('and')
disp(root2)


x = -4:0.1:4;
y = x.^2 - x;
figure(2); hold on
 xlabel('x')
ylabel('y')
title('Plot of y vs x for a parabola and ellipse')
plot(x,y);
y1 = sqrt(1 - (x.^2/16));
 y2 = -sqrt(1 - (x.^2/16));
figure(2);
plot(x,y1); hold on
figure(2);
plot(x,y2);
axis([-4 4 -8 20])


%%Question2b)

The root is
   -0.5000
    0.8660


%%Question2c)


x0 =

    -2
     4


x0 =

     2
     3

The roots are
   -0.6127
    0.9882

and
    1.5810
    0.9186
```




```
end
```

Published with MATLAB® R2020a