Problem Set 2

Question 1

1.1

```
%PS2 P1 Bisection 1
function zero=bisec(x_l,x_h,e,f)
%check if x_l<x_h and if so interchange values
if x_l>x_h;
    dummy=x_h;
    x_h=x_l;
    x_l=dummy;
end
%check if x_l and x_h are on the same side of the zero
if f(x_l)*f(x_h)>0;
    error('values are on the same side')
end
%check parameeter values
if e<=0; or d<=0;
    error('epsilon and delta have to be positive');
end
diff=x_h-x_l;
%stopping criterion at beginning
while diff>e;
%compute midpoint
x_m=(x_l+x_h)/2;
%x_m is new x_h or x_l
if f(x_l)*f(x_m)<0
    x_h=x_m;
else
    x_l=x_m;
end
diff=x_h-x_l;
end
%return the zero value
zero=x_m;
```

1.2

```
%PS2 P1
%2. first function
function [y]=ffunction(t)
    y=t.^3+4-1./t;
end
```

```
%PS2 P1
%2. second function
function [z]=fffunction(v)
    z=-exp(-v)+exp(-v.^2);
end
```

```
clear;
%PS2 P1 2.
%get an idea how the function looks like, such that
    values can be guessed
i=1:300;
g=ffunction(i-40/40);
h=fffunction(i-40);
plot(g);
hold on
plot(h,'--r');
hold off
%do bisection
e=0.0001;
d=0.0001;
x_l=-5;
x_h=0.7;
fun=@ffunction;
a=bisec(x_l,x_h,e,fun);
x_l=0.01;
x_h=0.7;
b=bisec(x_l,x_h,e,fun);
x_l=0.1;
x_h=100;
fun=@fffunction;
c=bisec(x_l,x_h,e,fun);
x_l=0;
x_h=100;
fun=@fffunction;
d=bisec(x_l,x_h,e,fun);
disp(a)
disp(b)
disp(c)
disp(d)
```

1.3

A market equilibrium occurs when markets clear. This implies no excess demand (D) or supply (S) of Goods. Thus, $q_D = q_S$. This only occurs when $p_D = p_S$ (the market clearing price prevails).

$$p_D = p_S$$

using

$$p_D = a - b * q_D \text{ and } p_S = c + d * q_S^{\psi}$$

we get

$$a - b * q_D = c + d * q_S^{\psi}$$

$$0 = c + d * q_S^{\psi} - (a - b * q_D)$$

$$0 = c - a + d * q_S^{\psi} + b * q_D$$

$$0 = b * q_D + d * q_S^{\psi} - (a - c)$$

Since $q_D = q_S$ holds, this can be written as

$$0 = b * q + d * q^{\psi} - (a - c)$$

■

a=3, b=0.5, c=d=1, ψ=0.5

$0 = 0.5 \cdot q + \sqrt{q} - (3 - 1)$	
$0 = 0.5 \cdot q + \sqrt{q} - 2$	substitute:$x^2 = q$
$0 = 0.5x^2 + x - 2$	abc-formula
$x_1 = 1.236$	resubstitution: $q = x^2$
$x_2 = -3.236$	resubstitution invalid
$\rightarrow q = \pm 1.112$	$q > 0$
$\rightarrow q* = 1.112$	insert into: $p = 3 - 0.5q$
$\rightarrow p* = 2.444$	

```
%Univariate Function Problem 1.3
function dif=difference(q)
a=3;
b=0.5;
c=1;
d=c;
psi=0.5;
dif=b.*q+d.*q.^psi-a+c;
end
```

```
clear;
%PS2 Problem 1 3.
%get an idea how the difference looks like
x=0:10;
plot(x,difference(x));
%Use bisec algorithm
fun=@difference;
p=bisec(0,5,0.0001,fun);
disp(p)
%use fzero with guess 1
z=fzero(fun,1);
disp(z)
%Gauss-Seidel fixed point iteration
%initial values
i=1;
p(i)=0.1;
q(i)=0.1;
qdiff=1; %just >epsilon to get into the loop
%stopping criterion
e=0.0001;
delta=0.001;
maxi=25;
while i-1<maxi && qdiff>e*(1+abs(q(i)))
   i=i+1;
   p(i)=demand(q(i-1));
   q(i)=supply(p(i));
   qdiff=abs(q(i)-q(i-1));
end
d=abs(supply(q(i))-q(i));
if d<=delta
    disp('success')
end
if d>delta
    disp('failure')
end
disp(i-1);
disp(q(i))
%there is a solution after 7 iterations, but "Failure"
%--> no convergence, reorder system of equations
```

```
function p=demand(k)
   a=3;
   b=0.5;
   p=a-b.*k;
end
```

```
function p=supply(l)
c=1;
d=c;
psi=0.5;
p=c+d.*l.^psi;
end
```

Question 2

```
clear;
i=1;
data=xlsread('MRW92QJE-data.xls');
%every row has 1 NaN, which is fine
while i<=length(data)
    summe=0;
    for j=1:size(data,2)
        if isnan(data(i,j))
            summe=summe+1;
        end
    end
    if summe>1
        data(i,:)=[];
        i=i-1;
    end
    i=i+1;
end
%subsamples
nonoil=[];
interm=[];
oecd=[];
for i=1:length(data)
    if data(i,3)==1
        nonoil=[nonoil;data(i,:)];
    end
    if data(i,4)==1
        interm=[interm;data(i,:)];
    end
    if data(i,5)==1
        oecd=[oecd;data(i,:)];
    end
end
%multiple regression
%nonoil
y1=log(nonoil(:,7))-log(nonoil(:,6));
```

```
x1=[ones(length(nonoil),1) log(nonoil(:,6)) log(nonoil
    (:,10)) log(nonoil(:,9)+0.05) log(nonoil(:,11))];
[b1,a11,a12,a13,stats1]=regress(y1,x1);
%interm
y2=log(interm(:,7))-log(interm(:,6));
x2=[ones(length(interm),1) log(interm(:,6)) log(interm
    (:,10)) log(interm(:,9)+0.05) log(interm(:,11))];
[b2,a21,a22,a23,stats2]=regress(y2,x2);
%nonoil
y3=log(oecd(:,7))-log(oecd(:,6));
x3=[ones(length(oecd),1) log(oecd(:,6)) log(oecd(:,10))
    log(oecd(:,9)+0.05) log(oecd(:,11))];
[b3,a31,a32,a33,stats3]=regress(y3,x3);
%display
obs=[length(nonoil) length(interm) length(oecd)];
Sample={'Observations:'; 'Constants:' ;'SE'; 'ln(Y60)' ;'
    SE'; 'ln(I/G)'; 'SE'; 'ln(n+g+delta)' ;'SE'; 'ln(
    schooling)'; 'SE'; 'R^2'; 's.e.e'};
Nonoil=[length(nonoil) b1(1) abs((a11(1,1)+a11(1,2))*sqrt
    (obs(1))/1.96) b1(2) abs((a11(2,1)+a11(2,2))*sqrt(obs
    (1))/1.96) b1(3) abs((a11(3,1)+a11(3,2))*sqrt(obs(1))
    /1.96) b1(4) abs((a11(4,1)+a11(4,2))*sqrt(obs(1))
    /1.96) b1(5) abs((a11(5,1)+a11(5,2))*sqrt(obs(1))
    /1.96) stats1(1) stats1(4)];
Nonoil=transpose(Nonoil);
Intermediate=[length(interm) b2(1) abs((a21(1,1)+a21(1,2)
    )*sqrt(obs(2))/1.96) b2(2) abs((a21(2,1)+a21(2,2))*
    sqrt(obs(2))/1.96) b2(3) abs((a21(3,1)+a21(3,2))*sqrt(
    obs(2))/1.96) b2(4) abs((a21(4,1)+a21(4,2))*sqrt(obs
    (2))/1.96) b2(5) abs((a21(5,1)+a21(5,2))*sqrt(obs(2))
    /1.96) stats2(1) stats2(4)];
Intermediate=transpose(Intermediate);
OECD=[length(oecd) b3(1) abs((a31(1,1)+a31(1,2))*sqrt(obs
    (3))/1.96) b3(2) abs((a31(2,1)+a31(2,2))*sqrt(obs(3))
    /1.96) b3(3) abs((a31(3,1)+a31(3,2))*sqrt(obs(3))
    /1.96) b3(4) abs((a31(4,1)+a31(4,2))*sqrt(obs(3))
    /1.96) b3(5) abs((a31(5,1)+a31(5,2))*sqrt(obs(3))
    /1.96) stats3(1) stats3(4)];
OECD=transpose(OECD);
T=table(Sample,Nonoil,Intermediate,OECD)
T.Properties.VariableNames{'Sample'} = 'Sample';
T.Properties.VariableNames{'Nonoil'} = 'Nonoil';
T.Properties.VariableNames{'Intermediate'} = '
    Intermediate';
T.Properties.VariableNames{'OECD'} = 'OECD';
```