ECON 512: Empirical Methods
Orville Mondal Assignment 1

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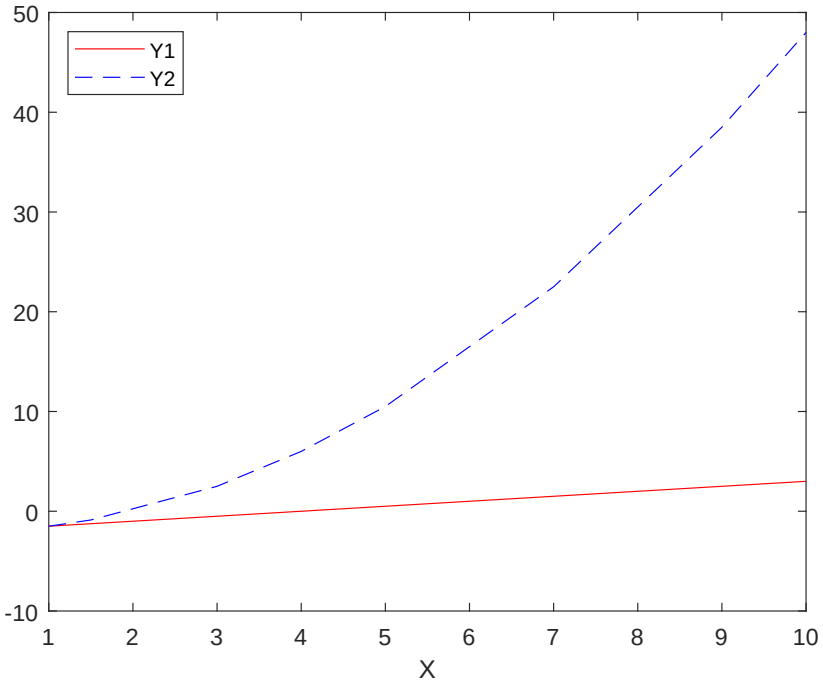
1. The figure produced is:



2. The sum is 1000. The vector is generated using the `linspace` command.

3. $$C = A'b = \begin{bmatrix} 29 \\ 133 \\ 43 \end{bmatrix}, \quad D = (A'A)^{-1}b = \begin{bmatrix} -3.2502 \\ 0.3961 \\ 0.8037 \end{bmatrix}, \quad E = \sum_i \sum_j [a_{ij} b_i] = 205$$

   The solution to the system of equations is $(-0.1622, 1.2432, -1.1081)'$.

4. Self explanatory in code.

5. Self explanatory in code.

6. What follows are the OLS estimates of the coefficients and the "naive" standard errors (assuming strict exogeneity of error terms). This means the standard errors are not corrected for clustering.

$$\hat{\beta} = \begin{bmatrix} 0.0817 \\ 0.1201 \\ 0.1399 \\ 0.0295 \end{bmatrix}, \quad \hat{\sigma}_\beta = \begin{bmatrix} 0.0193 \\ 0.0061 \\ 0.0089 \\ 0.0020 \end{bmatrix}$$

Matlab Code

```
%% Question 1
X=[1 1.5 3 4 5 7 9 10]';
Y1=-2+0.5*X; Y2=-2+0.5*(X.^2);
plot(X,Y1,'r-',X,Y2,'b--');
legend('Y1','Y2','Location','northwest'); xlabel('X');
%% Question 2
vector=linspace(-10,20,200)';
q2=sum(vector);
%% Question 3
A=[2 4 6;1 7 5;3 12 4]; b=[-2;3;10];
C=A'*b; D=inv(A'*A)*b; E=b'*sum(A,2);F=A(1,:);
q3=A\b;
%% Question 4
B=blkdiag(A,A,A,A,A);
%% Question 5
A=normrnd(10,5,5,3);
B=(A>=10);
%% Question 6
M=csvread('F:\PSU Coursework\512 Empirical Methods\Homework-master\Homeworks\
    hw1\datahw1.csv');
Y=M(:,5); X=[ones(size(M,1),1) M(:,3) M(:,4) M(:,6)];
n=size(M,1);
S1=(X'*X); S2=X'*Y;
b_hat=S1\S2;
% Naive standard errors
e_hat=Y-X*b_hat;
e_bar=repmat(e_hat,1,4);
X1=X.*e_bar;
V=X1'*X1; D=X'*X;
var=inv(D)*V*inv(D);
%{
%Somewhat less naive
omega=zeros(4,4);
for k=1:4:n-3
      e_i=e_hat(k:k+3);
      omega=omega+(e_i*(e_i'))/(n/4);
end
Q=zeros(4,4); W=zeros(4,4);
for k=1:4:n-3
      x_i=X(k:k+3,:);
      Q=Q+(x_i'*x_i)/(n/4);
      W=W+(x_i'*omega*x_i)/(n/4);
end
var=inv(Q)*W*inv(Q);
% Trying out the estimator from Hansen, Journal of Econometrics, 2007
w_hat=zeros(4,4);
for j=1:4:n-3
      temp1=X(j:j+3,:)'*e_hat(j:j+3);
      w_hat=w_hat+(temp1'*temp1)/n;
end
var=inv(Q)*w_hat*inv(Q);
%}
```