Empirical Methods Homework 1

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Question 1:

Code:

```
% Define vector X
x=[1, 1.5, 3, 4, 5, 7, 9, 10];

% Compute The Values for y1=-2 + 0.5x
y1=-2 + 0.5.*x;

% Display y1
disp(y1')
```

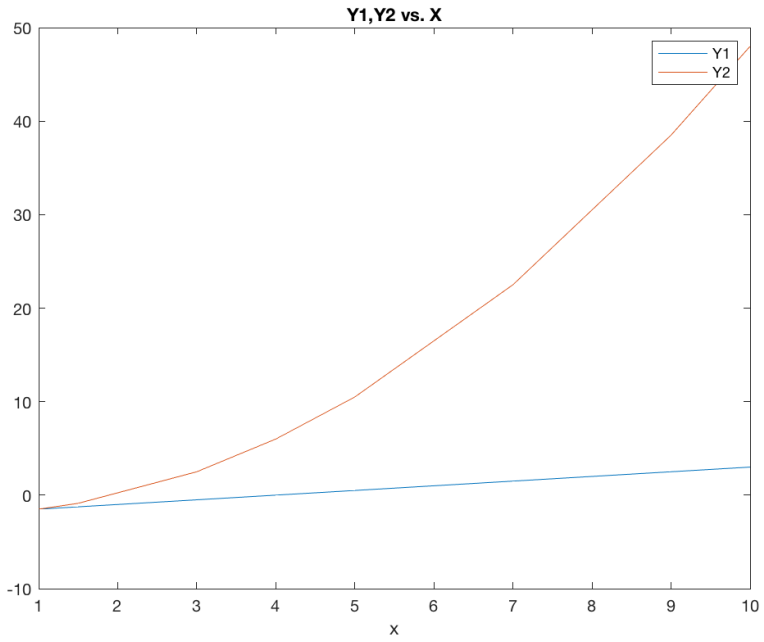
```
-1.5000
-1.2500
-0.5000
      0
 0.5000
 1.5000
 2.5000
 3.0000
```

```
% Compute the values for y2
y2= -2 + 0.5 .* x.^2;

% Display y2
disp(y2')
```

```
-1.5000
-0.8750
 2.5000
 6.0000
10.5000
22.5000
38.5000
48.0000
```

```
% Plot Y1, Y2 vs X
figure
plot(x, y1, x, y2)
title("Y1,Y2 vs. X")
xlabel("x")
legend("Y1", "Y2")
```



Question 2

Code:

```
% Create x vector
x = linspace(-10, 20);

% Calculate and display sum of the elements of x
sum_x = sum(x)
```

```
sum_x =  500.0000
```

Question 3

Code:

```
% Create A matrix
A=[2, 4, 6; 1, 7, 5; 3, 12, 4];

% Create vector b
b=[-2;3;10];

% Calculate and display C=A'b
C=A'*b;

% Calculate and display D=((A'A)^(-1))*b
D=inv(A'*A)*b
```

```
D = 3x1
   -3.2505
    0.3961
    0.8037
```

```
% Calculate and Display E= sum_i (sum_j aij*bi)
E=sum(sum(A.*b))
```

```
E = 205
```

```
% F matrix is matrix with the 2nd row and 3rd ...
   column deleted

% Initialize F to A
F=A;

% Delete 2nd row
F(2,:) = [];

% Delete 3rd column and display F
F(:,3) = []
```

```
F = 2x2
     2     4
     3    12
```

```
% Solve the system Ax=b
x=A\b
```

```
x =  3x1
   -0.1622
    1.2432
   -1.1081
```

Question 4

Code:

```
% Create block diagonal matrix

% Initialize B to a 15 x 15 zero matrix
B=blkdiag(A,A,A,A,A)
```

```
B = 15×15
     2     4     6     0     0     0     0     0     0     0     0     0     0     0     0
     1     7     5     0     0     0     0     0     0     0     0     0     0     0     0
     3    12     4     0     0     0     0     0     0     0     0     0     0     0     0
     0     0     0     2     4     6     0     0     0     0     0     0     0     0     0
     0     0     0     1     7     5     0     0     0     0     0     0     0     0     0
     0     0     0     3    12     4     0     0     0     0     0     0     0     0     0
     0     0     0     0     0     0     2     4     6     0     0     0     0     0     0
     0     0     0     0     0     0     1     7     5     0     0     0     0     0     0
     0     0     0     0     0     0     3    12     4     0     0     0     0     0     0
     0     0     0     0     0     0     0     0     0     2     4     6     0     0     0
     :
```

Question 5

Code:

```
% Create 5x3 matrix of randome distributions with ...
   mu= 10 and std=5

A=10+5*randn(5,3)
```

```
A =  5x3
    6.9984   -0.6918   10.6202
   12.4498    5.8021   17.1835
   13.6968   16.7730    0.1955
   18.5594    4.6392    9.0115
    9.0294   14.8048    3.9608
```

```
% Replace the elements of A that are less than 10 ...
    with 0
A(A<10)=0;

% Replace the elements of A that are equal or ...
    greater tan 10 with 1
A(A>=10)=1
```

```
A = 5x3
     0     0     1
     1     0     1
     1     1     0
     1     0     0
     0     1     0
```

Question 6

Code:

```
% Import CSV file
data = csvread('datahw1.csv');

T=readtable('datahw1.csv', 'ReadVariableNames', ...
    false);

% Modify variable names
T.Properties.VariableNames = {'FirmID', 'Year', ...
    'Export', 'RD', 'prod', 'cap'}

fitlm(T,'prod~Export+RD+cap')
```

```
Linear regression model:
    prod ~ 1 + Export + RD + cap

Estimated Coefficients:
                   Estimate       SE        tStat       pValue
                   ________    _________    ______    _________

    (Intercept)    0.082548     0.016719    4.9374      8.21e-07
    Export          0.11985    0.0063193    18.966    3.7356e-77
    RD              0.13992    0.0085321    16.399    1.0565e-58
    cap            0.029443    0.0017827    16.516    1.7144e-59


Number of observations: 4389, Error degrees of freedom: 4385
Root Mean Squared Error: 0.178
R-squared: 0.353,  Adjusted R-Squared 0.353
F-statistic vs. constant model: 798, p-value = 0
```