September 3, 2018

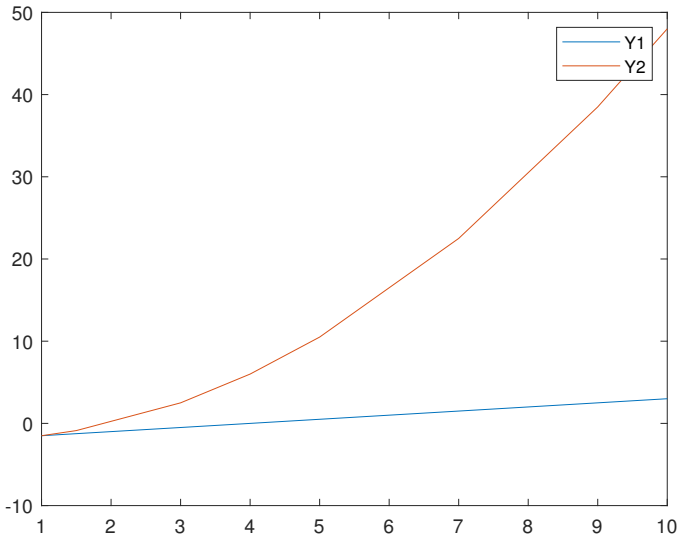
Empirircal Methods HA 1

Konstantin Guryev

Pennsylvania State University

2018

Problem 1 See the pic1.



Problem 2 The sum is equal to 1000

Problem 3

$$\text{C} = \begin{pmatrix} 29 \\ 133 \\ 43 \end{pmatrix}; \text{D} = \begin{pmatrix} -3.2505 \\ 0.3961 \\ 0.8037 \end{pmatrix}; \text{E} = 205; \text{F} = \begin{pmatrix} 2 & 4 \\ 3 & 12 \end{pmatrix}; \text{x} = \begin{pmatrix} -0.1622 \\ 1.2432 \\ -1.1081 \end{pmatrix}.$$

Problem 4 One liner code. I think there is no need in attaching the resulting matrix.

Problem 5

$$L = \begin{pmatrix} 8.0642 & 6.7597 & 10.4107 \\ 9.6053 & 10.7458 & 8.9353 \\ 11.7697 & 10.8751 & 11.9275 \\ 7.0215 & 11.0100 & 6.9552 \\ 4.7903 & 9.7087 & 11.0175 \end{pmatrix}; L_{new} = \begin{pmatrix} 0 & 0 & 1 \\ 0 & 1 & 0 \\ 1 & 1 & 1 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}.$$

Problem 6

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

Matlab Code

```
%Problem 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)
hold on
plot (X, Y2)
legend ('Y1','Y2')
hold off
%Problem 2%
X = linspace(-10,20,200);
Y=((X(1)+X(200))*200)/2;
%Problem 3%
A=[2 4 6; 1 7 5; 3 12 4];
b = [-2;3;10];
C=A'*b;
D = inv(A'*A)*b;
E = A(1:3,1)'*b + A(1:3,2)'*b + A(1:3,3)'*b;
%E=b'*sum(A,2) //easier way
A1 = A([1 3],:);
A1(:,3)=[];
F = A1;
x = inv(A)*b;
%Problem 4%
A=[2 4 6; 1 7 5; 3 12 4];
V = kron(eye(5),A);
%Problem 5%
L = sqrt(5).*randn(5,3) + 10;
for i = 1:1:5
    for j = 1:1:3
        if L(i,j)<10
            L(i,j)=0;
        else
            L(i,j)=1;
```

```
35            end
36        end
37    end
38    %Problem 6%
39    M=csvread('D:\PennState\Empirical Methods\datahw1.csv');
40    Y=M(:,5);
41    X=[ones(size(M,1),1) M(:,3) M(:,4) M(:,6)];
42    n=size(M,1);
43    bh=inv(X'*X)*X'*Y;
44    % Calculating errors manually
45    eh=Y-X*bh;
46    e=repmat(eh,1,4);
47    X1=X.*e;
48    V=X1'*X1; D=X'*X;
49    var=inv(D)*V*inv(D);
50    ster = sqrt(diag(var));
```