Practical 7: Regression 2

(a) Program for Multiple Regression

Problem Statement: Write and execute scilab code for the following:

The following data was calculated from the equation $y=5+4x_1-3x_2$

x1	x2	y
0	0	5
2	1	10
2.5	2	9
1	3	0
0	6	3
7	2	27

Use multiple linear regression to fit this data.

Scilab Code:

```
clc;
clear;
x1=[0,2,2.5,1,4,7];
x2=[0,1,2,3,6,2];
x1sum=0;
x2sum=0;
ysum=0;
x12sum=0;
x22sum=0;
x1ysum=0;
x2ysum=0;
x1x2sum=0;
n=6;
for i=1:6
   y(i)=5+4*x1(i)-3*x2(i);
   x12(i)=x1(i)^2;
   x22(i)=x2(i)^2;
   x1x2(i)=x1(i)*x2(i);
   x1y(i)=x1(i)*y(i);
   x2y(i)=x2(i)*y(i);
   x1sum=x1sum+x1(i);
   x2sum=x2sum+x2(i);
```

```
    ysum=ysum+y(i);
    x1ysum=x1ysum+x1y(i);
    x2ysum=x2ysum+x2y(i);
    x1x2sum=x1x2sum+x1x2(i);
    x12sum=x12sum+x12(i);
    x22sum=x22sum+x22(i);
end
X=[n,x1sum,x2sum;x1sum,x12sum,x1x2sum;x2sum,x1x2sum,x22sum];
Y=[ysum;x1ysum;x2ysum];
Z=inv(X)*Y;
a0=det(Z(1,1));
a1=det(Z(2,1));
a2=det(Z(3,1));
disp("a0=",a0);
disp("a1=",a1);
disp("a2=",a2);
disp("Thus, y=a0+a1*x1+a2*x2");
```

Output:

```
  "a0="

   5.0000000

  "a1="

   4.

  "a2="

  -3.0000000

  "Thus, y=a0+a1*x1+a2*x2"

--> |
```

(b) Program for Non-Linear Regression

Problem Statement: Write and execute exponential curve of form $y=ab^x$ to fit the following data.

x	1	2	3	4	5	6	7	8
y	1	1.2	1.8	2.5	3.6	4.7	6.6	9.1

Scilab Code:

```
clc;
clear;
x=[1 2 3 4 5 6 7 8];
y=[1.0 1.2 1.8 2.5 3.6 4.7 6.6 9.1];
Y=log(y);
n=8;
x2=0;
xY=0;
xsum=0;
ysum=0;
Ysum=0;
for i=1:8
   xsum=xsum+(det(x(1,i)));
   ysum=ysum+(det(y(1,i)));
   Ysum=Ysum+(det(Y(1,i)));
   x2=x2+(det(x(1,i))^2);
   xY=xY+(det(x(1,i))*(det(Y(1,i))));
end
disp("sum of all x=",xsum);
disp("sum of all y=",ysum);
disp("sum of all Y",Ysum);
disp("sum of x2=",x2);
disp("sum of product of x & Y=",xY);
X=[n,xsum;xsum,x2];
Z=[ysum;xY];
disp("y=",X^-1*Z)
a=exp(-0.3822)
disp("a=",a)
b=exp(0.3241)
disp("b=",b)
disp("the non linear equation is given by y=ab^x")
```

Output:

```
 "sum of all x="

  36.

 "sum of all y="

  30.5

 "sum of all Y"

  8.6102394

 "sum of x2="

  204.

 "sum of product of x & Y="

  52.358893

 "y="

  12.907976
 -2.0212168

 "a="

  0.6823586

 "b="

  1.3827856

 "the non linear equation is given by y=ab^x"

--> |
```