EKT 720 – Assignment 8, Non Linear Regression

Question 1:

Consider the following data:

```
data a (keep=x y) ;
 s=0 ;
 do i = 1 to 100 ;
   x= i ;
   y = sqrt((2.35*x+5.89))+rannor(5675)*s ;
   output;
 end ;
run ;

title ;
title2 ;

proc print data=a ;
run;
```

Use the data as indicated above to estimate the unknown parameters of the following model. $Y = \sqrt{\theta_1 X + \theta_2}$

1. Use a standard (but inefficient) grid search
2. Use SAS IML
3. Assume the parameters fall into the following intervals:
   a. $1 \le \theta_1 \le 3$
   b. $2 < \theta_2 \le 7$

Question 2:

1. Use the generation algorithm below to generate values of Y and X ;
2. Estimate the following functional form: $Y = \theta_1 + \frac{\theta_2 X}{e^X}$

```
data a ;

 do i = 1 to 20 ;
   x=i ;
   y = 30 - 80*x/(exp(x)) +rannor(11567)*1 ;
  output ;
  end ;
run;

proc print data =a ;
 run ;

proc plot data=a ;
 plot y*x ;
run ;
```

1. Use a standard (but inefficient) grid search
2. Use SAS IML
3. Assume the parameters fall into the following intervals:
   a. $20 \le \theta_1 \le 40$
   b. $-90 < \theta_2 \le -70$

Question 3:

Repeat question 2 using Newton Rhapson (**DO NOT** assume that the parameters are in a certain range)