Practial 5

The log of lifetime of 30 items are given below
3.21, 3.57, 3.63, 3.68, 3.74, 3.84, 4.21, 4.27, 4.48, 4.58, 4.72, 4.76, 4.76, 4.82 4.82, 4.93, 4.96, 5.15, 5.33, 5.35, 5.41, 5.46, 5.63, 5.84,6^+,6^+,6^+,6^+,6^+
let log of lifetime is N(θ,1),obtain ML estimate of θ using EM algorithm

Method

first of all we will estimate θ_j by

$$\theta_{j+1} = \frac{m}{n}\bar{y} + \frac{m-n}{n}\left(\theta_j + \frac{\phi(a-\theta_j)}{1-\phi(a-\theta_j)}\right)$$

workout

Putting the values in R

```
rm(list=ls())
x=c(3.21,3.57,3.63,3.68,3.74,3.84,4.21,4.27,4.48,4.58,4.72,4.76,
    4.82,4.82,4.93,4.96,5.15,5.33,5.35,5.41,5.46,5.63,5.84)
m<-length(x)
n<-30
```

Itereting the formula

```
theta<-0                #Initializing theta
i<-0
repeat
{

  thetanew <- (m/n)*mean(x)+((n-m)/n)*(theta+(dnorm(6-theta)/(1-dnorm(6-theta))))
  thetanew<- round(thetanew,4)                #rounding upto 5 decimal places
  i<- i+1                                     #Increasing i to count iteration
  cat( "\t",i,"  Iteration"," \t ")
  cat(thetanew ,"\n ")
  if(thetanew == theta)                       #checking condition to stop iteration
    break
  theta<-thetanew

}
```

```
##   1   Iteration       3.5463
##       2   Iteration       4.3785
##       3   Iteration       4.596
##       4   Iteration       4.6596
##       5   Iteration       4.6788
##       6   Iteration       4.6847
##       7   Iteration       4.6865
##       8   Iteration       4.6871
```

```
##        9   Iteration       4.6873
##        10   Iteration      4.6873
##
```

Conclusion

the EM estimate of θ is 4.6873