MTH 2401 Probability/Statistics

Name: AYUSH K JHA

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PROJECT 3

Answer 1:

Min { n >= K: $R_S(n,t)$ >= R}

Eqn 3.4 contains the following:

$R_S(n, t) = \Sigma^{n}_{j=k} (n \text{ choose } j)\, e^{-\lambda t})^{n-j} >= R$,

where, $\lambda = 0.008$, R = 0.93 & t = 75 (given)

Therefore,
$R_s(n,t) = 1 - \Sigma^{25}_{j=0} (n \text{ choose } j)\, e^{-j * (75)(0.008)} * (1-e^{-(75)(0.008)})^{n-j} >= R$

The values for N and R were then found(N=55 & R = 0.9379201), and they can be seen in the screenshots of the console and the source code below

Project3.R

```r
t<- 75
R<-0
N<-25
lambda <- 0.008
p<-exp(t * -lambda)

while(R < 0.93) {
  N = N + 1
  R <- 1 - pbinom(24,N,p)

}

studentName = "Ayush K Jha"
print(R)
print(N)
```

15:9 (Top Level) R Script

Console Terminal

```
> lambda <- 0.008
> p<-exp(t * -lambda)
>
> while(R < 0.93) {
+   N = N + 1
+   R <- 1 - pbinom(24,N,p)
+
+ }
>
> studentName = "Ayush K Jha"
> print(R)
[1] 0.9379201
> print(N)
[1] 55
>
```

Answer 2:

$N = \text{Min} \{ n >= K: R_S(n,t) >= R\}$

Eqn 3.4 contains the following:

$R_S(n, t) = \Sigma^{n}_{j=k} (n \text{ choose } j) e^{-0.5 \lambda t2})^{n-j} >= R,$

where, $\lambda = 7 \times 10^{-4}$, $R = 0.86$ & $t = 100$

The values for N and R were then found (N=1296 & R = 0.860543), and they can be seen in the screenshots of the console and the source code below:

RStudio

Project3.R

```
1  t<- 100
2  R<-0
3  N<-32
4  lambda <- 0.0007
5  p<-exp( t^2* lambda *-0.5)
6
7  while(R < 0.86) {
8    N = N + 1
9    R <- 1 - pbinom(32,N,p)
10
11 }
12
13 studentName = "Ayush K Jha"
14 print(R)
15 print(N)
```

15:9 (Top Level) R Script

Console Terminal

```
> lambda <- 0.0007
> p<-exp( t^2* lambda *-0.5)
>
> while(R < 0.86) {
+   N = N + 1
+   R <- 1 - pbinom(32,N,p)
+
+ }
>
> studentName = "Ayush K Jha"
> print(R)
[1] 0.8605043
> print(N)
[1] 1296
>
```