

MTH 2401 Probability/Statistics

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PROJECT 3

Answer 1:

$\text{Min } \{ n \geq K: R_S(n,t) \geq R \}$

Eqn 3.4 contains the following:

$$R_S(n, t) = \sum_{j=k}^n \binom{n}{j} e^{-\lambda t} (1 - e^{-\lambda t})^{n-j} \geq R,$$

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

Therefore,

$$R_S(n,t) = 1 - \sum_{j=0}^{25} \binom{n}{j} e^{-j * (75)(0.008)} * (1 - e^{-(75)(0.008)})^{n-j} \geq R$$

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 x

Source on Save Run Source

```
1 t<- 75
2 R<-0
3 N<-25
4 lambda <- 0.008
5 p<-exp(t * -lambda)
6
7 while(R < 0.93) {
8   N = N + 1
9   R <- 1 - pbinom(24,N,p)
10
11 }
12
13 studentName = "Ayush K Jha"
14 print(R)
15 print(N)
```

15:9 (Top Level) R Script

Console Terminal x

~/

```
> 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:

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

Eqn 3.4 contains the following:

$$R_s(n, t) = \sum_{j=k}^n \binom{n}{j} e^{-0.5 \lambda t^2} \geq R,$$

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:

Project3.R x

Source on Save Run Source

```
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
>
```

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