Digital Assignment-III

MAT5007

Statistics

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1	A recent national study showed that approximately 55.8% of college students have used Google as a source in at least one of their term papers. Let X equal the number of students in a random sample of size n = 42 who have used Google as a source: Find the probability that X is equal to 17. Find the probability that X is at most 13. Find the probability that X is bigger than 11. Find the probability that X is at least 15. Find the probability that X is between 16 and 19, inclusive

"Solution No. 1"

```
> "Moeenul Islam"
[1] "Moeenul Islam"
> n=42
> p=0.558
>
> l=n*p
> l
[1] 23.436
>
> "i)X=17"
[1] "i)X=17"
> x=17
> P1=dpois(x,l)
> P1
[1] 0.03620973
```

```
> "ii)X<=13"
[1] "ii)X<=13"
> x=13
> P2=ppois(x,l)
> P2
[1] 0.01413164
```

```
> "iii)X>11"
[1] "iii)X>11"
> x=11
> P3=sum(dpois(x+1:n,l))
> P3
[1] 0.9965276
```

```
> "iv)X>=15"
[1] "iv)X>=15"
> x=15
> P4=sum(dpois(15:n,l))
> P4
[1] 0.974207
```

```
> "v) 16<=X<=19"
[1] "v) 16<=X<=19"
>
> a=16
> b=19
> P5=sum(dpois(a:b,l))
> P5
[1] 0.1677728
```

2	In a street of 200 families, 40 families purchase the Hindu newspaper. Among the families a sample of 10 families is selected, find the probability that (i) Only one family purchase the news paper (ii) No family purchasing (iii) Not more than one family purchase it

"Solution No. 2"

```
[1] "Question 2"
> #Moeenul Islam
> p=40/200
> p
[1] 0.2
> n=10
> "i)X=1"
[1] "i)X=1"
> x=1
> P1=dbinom(x,n,p)
> P1
[1] 0.2684355
```

```
> "ii)X=0"
[1] "ii)X=0"
> x=0
> P2=dbinom(x,n,p)
> P2
[1] 0.1073742
>
```

```
> "iii)X<=1"
[1] "iii)X<=1"
> x=1
> P3=pbinom(x,n,p)
> P3
[1] 0.3758096
```

3	If 2% of electric bulbs manufactured by a certain company are defective find the probability that in a sample of 200 bulbs (i) less than 2 bulbs are defective (ii) more than 3 bulbs are defective. [$e^{-4} = 0.0183$]

"Solution No. 3"

```
[1] "Question 3"
> #Moeenul Islam
> p=0.02
> n=200
> l=n*p
> "i)X<2"
[1] "i)X<2"
> x=2
> P1=ppois(x-1,l)
> P1
[1] 0.09157819
```

```
> "ii)X>3"
[1] "ii)X>3"
> x=3
> P2=sum(dpois(x+1:n,l))
> P2
[1] 0.5665299
```

4	A factory employing a huge number of workers find that over a period of time, average absentee rate is three workers per shift. Calculate the probability that in a given shift (i) exactly 2 workers (ii) more than 4 workers will be absent?

"Solution No. 4"

```
> #Moeenul islam
> l=3
> "i)X=2"
[1] "i)X=2"
> x=2
> P1=dpois(x-1,l)
> P1
[1] 0.1493612
```

```
> "ii)X>4"
[1] "ii)X>4"
> x=4
> P2=1-ppois(x,l)
> P2
[1] 0.1847368
>
```

If there are 400 errors in a book of 1000 pages, find the probability that a randomly chosen page from the book has exactly 3 errors.

"Solution No. 5"

```
[1] "Question 5"
> #Moeenul Islam
> p=1000
> n=400
> l=n/p
> l
[1] 0.4
>
> "P(X=3)"
[1] "P(X=3)"
> x=3
> P=dpois(x,l)
> P
[1] 0.00715008
```