## Distribution Sample

---------------------------------------------------------**Normal Distribution**----------------------------------------------------------

**Question 1.**

An automatic camera records the number of cars running a red light at an intersection (that is, the cars were going through when the red light was against the car). Analysis of the data shows that on average 15% of light changes record a car running a red light. Assume that the data has a binomial distribution. What is the probability that in 20 light changes there will be exactly three (3) cars running a red light?

**Solution:**

p=0.15

q=1-p n=20 x=3

Formula for Normal distribution is n cx px qn-x

= 20 \* (20/20-3! \*3!) \* 0.15 3 \* (1-0.15) 20-3

= 20 \* 1140 \* 0.003375 \*0.0631142

= 0.2428

= 24%

**Question 2.**

Inland Revenue audits 5% of all companies every year. The companies selected for auditing in any one year are independent of the previous year’s selection.

a) What is the probability that the company ‘Ross Waste Disposal’ will be selected for auditing exactly twice in the next 5 years?

b) What is the probability that the company will be audited exactly twice in the next 2 years?

c) What is the exact probability that this company will be audited at least once in the next 4 years?

**Solution:**

|  |  |  |
| --- | --- | --- |
| a)  P=5%  q=1-p = 1-0.5 = 0.95 = 95%  = 5 C 2  (5/100) 2 (95/100)3  Where 5 C 2  = 5\*4/2\*1 = **10**  = 10 \* 0.0025 \* 0.857375  = **2.14** | b)  = 2C2 (5/100)2 (95/100)3  = 1\*0.0025\*1  = **0.25** | c)  = 1 - 4C0 (5/100)0 (95/100)4  = 1-(1\*1\*0.814)  = **0.185** |

------------------------------------------------------------**Poisson Distribution**-------------------------------------------------------

**Question 1.**

The average number of accidents at a level-crossing every year is 5. Calculate the probability that there are exactly 3 accidents there this year.

**Solution:**

P (X >/ 1) = 1-P(X=0)

X=0 =3

= e-3 30 / 0!

= 0.0497 \* 1 / 1

= 0.9503

**Question 2.**

A 5-litre bucket of water is taken from a swamp. The water contains 75 mosquito larvae. A 200mL flask of water is taken form the bucket for further analysis. What is

a) The expected number of larvae in the flask?

b) The probability that the flask contains at least one mosquito lava?

**Solution:**

5 -> 75%

200 ML –> 3%

= e-5 53 / 3!

= 0.0067 \* 125 /6

= 0.1395