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GSLC Statistics 2

① A college found that 20% of its student left after first year without completing the ~~intr~~ introductory statistics course. Assume that 20 students registered for the course & the probability of leaving college follows a binomial distribution, compute

$n = 20$	$q = 1 - p$
$p = 20/100$	$q\ 4/5$

a) Expected number of withdrawals

$= n \cdot p$

$= 20 \cdot 20\%$

$\boxed{= 4 \Rightarrow}$ expected number of withdrawals

b) Probability that exactly 3 students withdrawn

$x = 3$

$P(\cancel{20}\ 3\,\text{student}) = 20C3 \cdot (1/5)^3 \cdot (4/5)^{17}$

$= \dfrac{20!}{(20-3)!\,20!} (1/5)^3 (4/5)^{17}$

$\boxed{= \cancel{0{,}182}\ 0{,}205}$

c) The probability that more than 3 student withdrawn $(x > 3)$

$P(4 - 20\ \text{student}) = 1 - [\,20C0 \cdot (1/5)^0 \cdot (4/5)^{20} +$
$20C_1 \cdot (1/5)^1 \cdot (4/5)^{19} +$
$20C_2 \cdot (1/5)^2 \cdot (4/5)^{18} +$
$20C3 \cdot (1/5)^3 \cdot (4/5)^{17}\,]$

$= 1 - (0{,}016 + 0{,}058 + 0{,}137 + 0{,}205)$

$= 1 - 0{,}416$

$\boxed{= 0{,}584}$

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② During the period of a time that a local uni takes phone in regis calls comes in rate of one every 2 min

$t_1 = 2 min \quad \lambda = 1$

a) Expected number of calls in an hour

$$\frac{\lambda_2}{\lambda_1} = \frac{t_2}{t_1} \qquad \boxed{\lambda = 30 \text{ calls}}$$

$$\frac{\lambda_2}{1} = \frac{60}{2}$$

The expected number of calls in an hour is 30 calls

b) Probability of getting 3 calls in 5 min

$$\frac{\lambda_2}{\lambda_1} = \frac{t_2}{t_1}$$

$$\frac{\lambda_2}{1} = \frac{5}{2}$$

λ_2 2,5 calls

$x = 3$

$$P(x=3) = \frac{\lambda^x e^{-\lambda}}{x!}$$

$$= \frac{2{,}5^3 e^{-2{,}5}}{3!}$$

$$= 0{,}2137$$

The probability of getting 3 calls in 5 minute is 21,38 %

c) Probability of getting 0 calls in 5 min

$$P(x=0) = \frac{\lambda^x e^{-\lambda}}{x!}$$

$$= \frac{2{,}5^0 e^{-2{,}5}}{0!}$$

$$= 0{,}08208$$

$$= 0{,}0821$$

The probability of getting 0 calls in 5 minute is 8,21 %