① Deriven la Modificación de la distr.° $Po(n|\lambda)$

donde $Q(N_t=0)=0$

$Q(N_t=1)=1/3$

$$Q(N_t=n) = \begin{cases} 0 & n=0 \\ 1/3 & n=1 \\ \left(\frac{2}{3}\right)\dfrac{\frac{e^{-\lambda}\lambda^n}{n!}}{\sum_{k=2}^{\infty}\frac{e^{-\lambda}\lambda^k}{k!}} & n=2,3,\dots \end{cases}$$

$\Rightarrow$ ~~Q(...)~~

$$\Rightarrow Q(N_t=n) = \begin{cases} P_0 & n=0 \\ P_1 & n=1 \\ \vdots & \\ P_{m-1} & n=m-1 \\ \left(1-\sum_{k=0}^{m-1}P_k\right)\dfrac{f_{N_t}(n)}{\mathbb{P}(N_t\geq m)} & n=m, m+1, \dots \end{cases}$$

Tarea 4 Gabriel Mauricio Moreno

2) $N_t | n \leq 15 \sim Po(n | 30)$ y $N_t | n > 15 \sim Bin(n | 100, 1/3)$

Tomando como base a $Po(n|30)$

$$\Rightarrow Q(N_t = n) = \begin{cases} \dfrac{e^{-30} \, 30^{n}}{n!} \mathbb{1}_{(n \leq 15)} \\ \dfrac{\left[1 - \sum_{k=0}^{15} \frac{e^{-30} 30^{k}}{k!}\right] \binom{100}{n} \left(\frac{1}{3}\right)^{n} \left(\frac{2}{3}\right)^{100-n}}{1 - \sum_{k=0}^{15} \binom{100}{k} \left(\frac{1}{3}\right)^{k} \left(\frac{2}{3}\right)^{100-k}} \mathbb{1}_{(n = 16, 17, \ldots, 100)}(n) \end{cases}$$

en general si $N_t | n \leq 15 \sim Po(n|30) \longrightarrow X \leq 15 \sim Po(\lambda)$

y $N_t | n > 15 \sim Bin(n|100, 1/3) \Rightarrow X > 15 \sim Bin(n, \theta)$

$$\Rightarrow Q(N_t = n) = \begin{cases} f_{X_{Poisson}}(x) \, \mathbb{1}_{(x = 0, 1, 2, \ldots, 15)}(x) \\ \dfrac{\mathbb{P}[X_{Poisson} > 15] \binom{n}{x} \theta^{x} (1-\theta)^{n-x} \mathbb{1}_{(x = 16, \ldots, n)}(x)}{\mathbb{P}[X_{Bin} > 15]} \end{cases}$$

$\longrightarrow$ Probabilidad acumulada de la f_Y