2. Deriven la modificación en la que

$$N_t | N_t \leq 15 \sim Po(n|30)$$

y

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

Tomaremos la Poisson como base

Atomos fijos: $\{0, 1, \ldots, 14\}$

Atomos para modificar: $\{15, \ldots\}$

$$\rightarrow q_n : \tilde{\mathbb{P}}(N_t = n) = \frac{e^{-\lambda}\lambda^n}{n!} \quad n < 15$$

$$= \left(\frac{e^{-30} 30^n}{n!}\right) \mathbb{I}_{\{0,1,\ldots,14\}}$$

Por lo que tenemos que modificar la parte de la binomial

$$\left(1 - \sum_{k=0}^{14} \frac{e^{-30} 30^n}{n!}\right)$$

Ahora reconsiderando la binomial

$$\Rightarrow \frac{\binom{100}{n}\left(1/3\right)^n \left(\frac{2}{3}\right)^{100-n}}{\left(1 - \sum_{k=15}^{100} \binom{100}{k}(1/3)^k (2/3)^{100-k}\right)}$$

Reescalamos.

$$q(N_t = n) = \tilde{\mathbb{P}}(N_t > 15) \cdot \frac{P(N_t = n)}{P(N_t > 15)}$$

$$= \left(1 - \sum_{k=0}^{14} \frac{e^{-30} 30^k}{k!}\right) \frac{\binom{100}{n}\left(1/3\right)^n \left(\frac{2}{3}\right)^{100-n}}{\left(1 - \sum_{k=15}^{100} \binom{100}{k}(1/3)^k (2/3)^{100-k}\right)}$$

$$\therefore \mathbb{Q}(N_t = n) = \begin{cases} \dfrac{e^{-30} 30^k}{k!} & k < 15 \\ \left(1 - \sum_{k=0}^{14} \dfrac{e^{-30} 30^k}{n!}\right) \dfrac{\binom{100}{n}(1/3)^n \left(\frac{2}{3}\right)^{100-n}}{\left(1 - \sum_{k=15}^{100} \binom{100}{k}(1/3)^k (2/3)^{100-n}\right)} & k \geq 15 \end{cases}$$