$$P(X_N = x) = \sum_{n=0}^{\infty} P(X_N = x \mid N = n)\, P(N = n)$$

Probabilidad total.

$$P(X_N = x, N = n) = P(X_N = x \mid N = n)\, P(N = n)$$

Probabilidad condicional.

$$P(N = n, X_N = x) = P(N = n \mid X_N = x)\, P(X_N = x)$$

Necesitaré esto

$$P(X_N = x) = \sum_{n=0}^{\infty} P(X_N = x \mid N = n)\, P(N = n)$$

(Prob total)

(a)

$$P(N = n \mid X_N = x) = \frac{P(N = n, X_N = x)}{P(X_N = x)}$$

$$= \frac{P(X_N = x, N = n)}{P(X_N = x)}$$

Hip Binom ↙ Hip. Poisson ↙

$$= \frac{P(X_N = x \mid N = n)\, P(N = n)}{P(X_N = x)}$$

← Calculas antes.

En el incisos (b)

(b) $$E[X_N] = \sum_{x=0}^{\infty} x\, P(X_N = x)$$

(c) $$P(X_N = x, Y_N = y) = P(X_N = x)\, P(Y_N = y)$$