POUŽITEĽNÉ VZORCE PRE PREDMET
TEÓRIA HROMADNEJ OBSLUHY

Rozdelenie	*bin*(n, p)	*hyge*(M, K, n)	*poiss*(λ)	*unif*(a, b)	*exp*(λ)	*norm*(μ, σ)
E(X)	$n \cdot p$	$\frac{n \cdot K}{M}$	λ	$\frac{(a+b)}{2}$	λ	μ
D(X)	$n \cdot p \cdot (1-p)$	$\frac{nK(M-K)(M-n)}{M^2(M-1)}$	λ	$\frac{(a+b)^2}{12}$	λ^2	σ^2

$p(n+1) = p(n) \cdot P$; $p(n+1) = p(0) \cdot P^{n+1}$; $a \cdot P = a$; $Z = \left[I - (P - A)\right]^{-1} = I + \sum_{n=1}^{\infty}(P^n - A)$;

$M = P \cdot (M - \hat{M}) + E$; $M = (I - Z + E \cdot \hat{Z}) \cdot \hat{M}$.

$p(t+\Delta t) = p(t) \cdot P(t, t+\Delta t)$; $p(t+\Delta t) = p(t) \cdot \left(I + A(t) \cdot \Delta t\right)$; $F(s) = p(0) \cdot [s \cdot I - A]^{-1}$.

$p(t+\Delta t) = p(t) \cdot P$; $p_0 = 1 - \frac{\lambda}{\mu} = 1 - \rho$; $P(N > \mathrm{n}) = \rho^{\mathrm{n}+1}$; $P(N > 0) = \rho = 1 - p_0$; $\overline{T} = \frac{\overline{n}}{\lambda}$;

$\overline{n} = \rho \cdot (1-\rho) \cdot \sum_{n=1}^{\infty} n \cdot \rho^{n-1}$; $\overline{n} = \frac{\rho}{1-\rho} = \frac{\lambda}{\mu - \lambda}$; $\overline{n}_f = \overline{n} - (1 - p_0) = \frac{\rho^2}{1-\rho} = \frac{\lambda^2}{\mu \cdot (\mu - \lambda)}$; $\overline{T}_f = \overline{T} - \frac{1}{\mu}$;

$p(t+\Delta t) = p(t) \cdot P$; $p_n = p_0 \cdot \frac{\rho^n}{n!}$; $p_n = p_0 \cdot \frac{\rho^n}{S^n} \cdot \frac{S^S}{S!}$; $p_0 = \left[\sum_{k=0}^{S-1} \frac{\rho^k}{k!} + \frac{\rho^S}{S!} \cdot \frac{1}{1 - \frac{\rho}{S}}\right]^{-1}$;

$P(N > S) = p_0 \cdot \frac{1}{1 - \frac{\rho}{S}}$; $\overline{n}_f = \sum_{n=S+1}^{\infty} (n - S) \cdot p_n$; $\overline{S} = \sum_{n=0}^{S} (S - n) \cdot p_n$; $\overline{n} = \overline{n}_f + S - \overline{S}$;

$\overline{n}_f = p_0 \cdot \frac{\rho^{S+1}}{(S+1)!} \cdot \frac{1}{\left(1 - \frac{\rho}{S}\right)^2}$; $\overline{T}_f = \frac{\overline{n}_f}{\lambda}$; $\overline{T} = \frac{\overline{n}}{\lambda} = \overline{T}_f + \frac{1}{\mu}$; $\overline{S} = S - \rho$.

$p_n = \left(\frac{\lambda}{\mu}\right)^n \cdot p_0$; $p_n = 0$; $p_0 = \frac{1-\rho}{1-\rho^{N+1}}$; $p_0 = \frac{1}{N+1}$; $p_n = \frac{(1-\rho) \cdot \rho^n}{1-\rho^{N+1}}$; $p_n = \frac{1}{N+1}$;

$\overline{n} = \sum_{n=0}^{N} n \cdot p_n = \frac{\rho \cdot \left[1 - (N+1) \cdot \rho^N + N \cdot \rho^{N+1}\right]}{(1-\rho) \cdot \left(1 - \rho^{N+1}\right)}$; $\overline{n} = \sum_{n=0}^{N} n \cdot p_n = \frac{N}{2}$; $\overline{n}_f = \overline{n} - \frac{\rho \cdot \left(1 - \rho^n\right)}{1 - \rho^{N+1}}$; $\overline{T} = \frac{\overline{n}}{\lambda^*}$;

$\overline{T}_f = \frac{\overline{n}_f}{\lambda^*}$; $\lambda^* = \lambda \cdot (1 - p_N)$; $p_N = \frac{(1-\rho) \cdot \rho^N}{1-\rho^{N+1}} = p_0 \cdot \rho^N$.

$$p_n = \frac{1}{n!}\left(\frac{\lambda}{\mu}\right)^n \cdot p_0 = p_0 \cdot \frac{(S\cdot\rho)^n}{n!}; \quad p_n = \frac{1}{S!\cdot S^{n-S}}\left(\frac{\lambda}{\mu}\right)^n \cdot p_0 = p_0 \cdot \frac{S^S\cdot\rho^n}{S!}; \quad p_0 = \left[\sum_{n=0}^{S-1}\frac{(S\cdot\rho)^n}{n!} + \sum_{n=S}^{N}\frac{(S\cdot\rho)^n}{S!\cdot S^{n-S}}\right]^{-1};$$

$$\overline{n}_f = \sum_{n=S}^{N}(n-S)\cdot p_n = p_0 \cdot \frac{S^S\rho^{S+1}}{S!\cdot(1-\rho)^2}\cdot\left[1-\rho^{N-S+1}-(1-\rho)\cdot(N-S+1)^{N-S}\right]; \qquad \overline{T}_f = \frac{\overline{n}_f}{\lambda^*}; \quad \overline{T} = \overline{T}_f + \frac{1}{\mu}.$$

$$p_n = p_0\cdot\rho^n\cdot\frac{M!}{(M-n)!}; \qquad p_n = 0; \qquad p_0 = \left[\sum_{n=0}^{M}\upsilon^n\cdot\frac{M!}{(M-n)!}\right]^{-1};$$

$$p_n = p_0\cdot\left(\frac{\lambda}{\mu}\right)^n\cdot\binom{M}{n} = p_0\cdot\left(\frac{\lambda}{\mu}\right)^n\cdot\frac{M!}{n!\cdot(M-n)!};$$

$$p_n = p_0\cdot\left(\frac{\lambda}{\mu}\right)^n\cdot\binom{M}{n}\cdot\frac{n!}{S!\cdot S^{n-S}} = p_0\cdot\left(\frac{\lambda}{\mu}\right)^n\cdot\frac{M!}{S!\cdot S^{n-S}\cdot(M-n)!}; \qquad p_n = 0;$$

$$p_0 = \left[\sum_{n=0}^{S-1}\binom{M}{n}\cdot\left(\frac{\lambda}{\mu}\right)^n + \sum_{n=S}^{M}\binom{M}{n}\cdot\left(\frac{\lambda}{\mu}\right)^n\cdot\frac{n!}{S!\cdot S^{n-S}}\right]^{-1};$$

$$\overline{n} = p_0\cdot\left[\sum_{n=0}^{S-1}n\cdot\binom{M}{n}\cdot\left(\frac{\lambda}{\mu}\right)^n + \sum_{n=S}^{M}n\cdot\binom{M}{n}\cdot\left(\frac{\lambda}{\mu}\right)^n\cdot\frac{n!}{S!\cdot S^{n-S}}\right];$$

$$\overline{n}_f = \sum_{n=S}^{M}(n-S)\cdot p_n = \overline{n} - S + p_0\cdot\sum_{n=0}^{S-1}(S-n)\cdot\binom{M}{n}\cdot\left(\frac{\lambda}{\mu}\right)^n \qquad \overline{T} = \frac{\overline{n}}{\lambda\cdot(M-\overline{n})}; \qquad \overline{T}_f = \frac{\overline{n}_f}{\lambda^*} = \frac{\overline{n}_f}{\lambda\cdot(M-\overline{n})}.$$

$$p_n = \sum_{m=0}^{n-1}\left(p_{(n-m),m,1} + p_{m,(n-m),2}\right) = (1-\rho)\cdot\rho^n; \quad p_0 = 1-\rho; \qquad \overline{n}_1 = \frac{\left(\frac{\lambda_1}{\mu}\right)\cdot\left(1+\rho-\frac{\lambda_1}{\mu}\right)}{1-\frac{\lambda_1}{\mu}}; \qquad \overline{n}_{f1} = \frac{\rho\cdot\left(\frac{\lambda_1}{\mu}\right)}{1-\frac{\lambda_1}{\mu}};$$

$$\overline{n}_2 = \frac{\left(\frac{\lambda_2}{\mu}\right)\cdot\left(1-\frac{\lambda_1}{\mu}+\rho\frac{\lambda_1}{\mu}\right)}{(1-\rho)\cdot\left(1-\frac{\lambda_1}{\mu}\right)}; \quad \overline{n}_{f2} = \frac{\rho\cdot\left(\frac{\lambda_2}{\mu}\right)}{(1-\rho)\cdot\left(1-\frac{\lambda_1}{\mu}\right)}; \qquad \overline{T}_{f1} = \frac{\lambda}{\mu\cdot(\mu-\lambda_1)}; \qquad \overline{T}_{f2} = \frac{\lambda}{(\mu-\lambda)\cdot(\mu-\lambda_1)}.$$