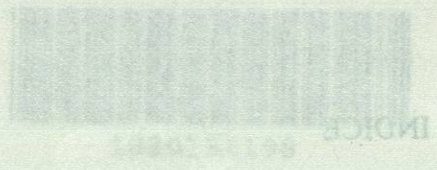


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INVESTIGACION DE OPERACIONES II

MODELO No. 1 (TASA DE LLEGADAS Y TASA DE SERVICIO CONSTANTE).
 POBLACION Y LINEA DE ESPERA ∞
 PARA S=1

$$C_n = \rho^n \quad \rho = \lambda / (S\mu) \quad P_n = \rho^n \cdot P_0 \quad P_0 = 1 - \rho$$

$$L = \lambda / (\mu - \lambda) \quad L_q = \lambda^2 / (\mu(\mu - \lambda)) \quad W = 1 / (\mu - \lambda) \quad W_q = \lambda / (\mu(\mu - \lambda))$$

$$P(W > t) = e^{-\mu(1-\rho)t} \quad \text{para } t \geq 0 \quad P(W_q > t) = \rho e^{-\mu(1-\rho)t} \quad \text{para } t \geq 0$$

PARA S > 1, n > 1

FORMULAS DE INVESTIGACION DE OPERACIONES II

$$C_n = (\lambda/\mu)^n / n! \quad \text{para } n = 1, 2, \dots, S \quad C_n = \frac{(\lambda/\mu)^n}{S! S^{n-S}} \quad \text{para } n = S, S+1, \dots$$

$$P_0 = \frac{1}{\sum_{n=0}^{S-1} \frac{(\lambda/\mu)^n}{n!} + \frac{(\lambda/\mu)^S}{S!} \frac{1}{1 - (\lambda/S\mu)}}$$

$$L = L_q + \frac{\lambda}{\mu}$$

$$L_q = \frac{P_0 (\lambda/\mu)^S \rho}{S! (1-\rho)^2} \quad W_q = \frac{L_q}{\lambda} \quad W = W_q + \frac{1}{\mu}$$

$$P_n = \frac{(\lambda/\mu)^n}{n!} P_0 \quad \text{Si } 0 < n < S \quad P_n = \frac{(\lambda/\mu)^n}{S! S^{n-S}} P_0 \quad \text{Si } n \geq S$$



**MODELO No. 1 (TASA DE LLEGADAS Y TASA DE SERVICIO CONSTANTE).
POBLACION Y LINEA DE ESPERA ∞
PARA $S=1$**

$$C_n = \rho^n \quad \rho = \lambda / (S\mu) \quad P_n = \rho^n P_0 \quad P_0 = 1 - \rho$$

$$L = \lambda / (\mu - \lambda) \quad L_q = \lambda^2 / \mu(\mu - \lambda) \quad W = 1 / (\mu - \lambda) \quad W_q = \lambda / \mu(\mu - \lambda)$$

$$P\{W > T\} = e^{-\mu(1-\rho)t}, \text{ para } t \geq 0 \quad P\{W_q > t\} = \rho e^{-\mu(1-\rho)t}, \text{ para } t \geq 0$$

PARA $S > 1, n > 1$

$$C_n = (\lambda/\mu)^n / n!, \text{ para } n = 1, 2, \dots, S \quad C_n = \frac{(\lambda/\mu)^n}{S! S^{n-S}}, \text{ para } n = S, S+1, \dots$$

$$P_0 = \frac{1}{\sum_{n=0}^{S-1} \frac{(\lambda/\mu)^n}{n!} + \frac{(\lambda/\mu)^S}{S!} \frac{1}{1 - (\lambda/S\mu)}} \quad L = L_q + \frac{\lambda}{\mu}$$

$$L_q = \frac{P_0 (\lambda/\mu)^S \rho}{S! (1-\rho)^2} \quad W_q = \frac{L_q}{\lambda} \quad W = W_q + \frac{1}{\mu}$$

$$P_n = \frac{(\lambda/\mu)^n}{n!} P_0, \text{ Si } 0 < n < S \quad P_n = \frac{(\lambda/\mu)^n}{S! S^{n-S}} P_0, \text{ Si } n \geq S$$



MODELO No. 1 (TASA DE LLEGADAS Y TASA DE SERVICIO CONSTANTE)
POBLACION Y LINEA DE ESPERA

$$P\{W > t\} = e^{-\mu t} \left[\frac{1 + P_0(\lambda/\mu)^S}{S!(1-\rho)} \cdot \frac{(1 - e^{-\mu t(S-1-\lambda/\mu)})}{(S-1-\lambda/\mu)} \right]$$

$$P\{W_q > t\} = [1 - P\{W_q = 0\}] e^{-S\mu(1-\rho)t}$$

$$P\{W_q = 0\} = \sum_{n=0}^{S-1} P_n$$

PARA $S > 1, n < 1$

$$C_n = (\lambda/\mu)^n \quad \text{para } n = 0, 1, 2, \dots, S-1$$

$$P_0 = \frac{1}{1 + \sum_{n=1}^{S-1} \frac{(\lambda/\mu)^n}{n!} + \frac{(\lambda/\mu)^S}{S!(1-\rho)}}$$

$$W = \frac{1}{\mu} + \rho W \quad \text{or} \quad W = \frac{1}{\mu(1-\rho)}$$

$$P_n = \frac{(\lambda/\mu)^n P_0}{n!} \quad \text{para } n = 0, 1, 2, \dots, S-1$$

MODELO No. 2 (LINEA DE ESPERA FINITA, POBLACION ∞ , TASA DE LLEGADAS Y SERVICIO CONSTANTES)

PARA $S = 1$

$$\lambda_n = \lambda \quad \text{para } n = 0, 1, 2, \dots, M-1$$

$$\lambda_n = 0 \quad \text{para } n \geq M$$

$$C_n = (\lambda/\mu)^n = \rho^n \quad \text{para } n = 1, 2, 3, \dots, M$$

$$C_n = 0 \quad \text{para } n > M$$

$$P_0 = \frac{1 - \rho}{1 - \rho^{(M+1)}} \quad P_n = \frac{1 - \rho}{1 - \rho^{(M+1)}} \rho^n \quad \text{para } n = 0, 1, \dots, M$$

$$L = \frac{\rho}{1 - \rho} - \frac{(M+1)\rho^{(M+1)}}{1 - \rho^{(M+1)}} \quad L_q = L - (1 - P_0) \quad W = \frac{L}{\lambda}$$

$$W_q = \frac{L_q}{\lambda} \quad \bar{\lambda} = \lambda(1 - P_M)$$

$$L_q = M - \frac{1 - P_0}{\lambda} \quad L = \sum_{n=0}^{\infty} n P_n = L_q + (1 - P_0) = M - \frac{1 - P_0}{\lambda} + (1 - P_0)$$

PARA $S > 1, S < M$

$$C_n = \frac{(\lambda/\mu)^n}{n!} \quad \text{para } n = 1, 2, \dots, S$$

$$C_n = \frac{(\lambda/\mu)^n}{n-S} \quad \text{para } n = S, S+1, \dots, M \quad C_n = 0 \quad \text{para } n > M$$

$$P_n = \frac{(\lambda/\mu)^n P_0}{n!} \quad \text{para } n = 1, 2, \dots, S$$

$$C_n = 0 \quad \text{para } n > M$$

$$P_n = \frac{(\lambda/\mu)^n}{n!} P_0 \quad \text{para } n = S, S+1, \dots, M \quad P_n = 0 \quad \text{para } n > M$$