

Example 4.1

Q: ρ $\pi_1 - \pi_4$ U L W Q D ?

MM 1 4 $\lambda = 8$ parts/h $\mu = 10$ parts/h

Solution from Table

$$\rho = \frac{\lambda}{\mu} = \frac{8}{10} = 0.8$$

$$\pi_0 = \frac{1-\rho}{1-\rho^{N+1}} = \frac{1-0.8}{1-0.8^5} = 0.2975$$

$$\pi_k = \frac{\rho^k (1-\rho)}{1-\rho^{N+1}} = \frac{0.8^k \times 0.2}{1-0.8^5}$$

$$1-\pi_0 = 0.703$$

$$U = \cancel{\rho = 0.8} \quad P_6 \quad \text{为什么 } U \neq \rho?$$

$$\pi_1 = 0.2380$$

$$L = \frac{\rho [1 - \rho^N - N \rho^{N-1} (1-\rho)]}{(1-\rho) (1-\rho^{N+1})}$$

$$\pi_2 = 0.1904$$

$$= \frac{0.8 [1 - 0.8^4 - 4 \times 0.8^3 \times (1-0.8)]}{0.2 \times (1-0.8^5)}$$

$$\pi_3 = 0.1523$$

$$\pi_4 = 0.1218 \quad \text{ppt} \quad 0.123$$

$$= \cancel{1.0757} \rightarrow 1.566$$

$$Q = \frac{\rho^2 [1 - \rho^N - N \rho^{N-1} (1-\rho)]}{(1-\rho) (1-\rho^{N+1})}$$

$$= \frac{0.8^2 [1 - 0.8^4 - 4 \times 0.8^3 \times 0.2]}{0.2 \times (1-0.8^5)} = \cancel{0.8605} \rightarrow 0.863$$

$$W = \frac{1 - p^N - N p^{N-1} (1-p)}{\mu(1-p)(1-p^{N+1})} = \frac{1 - 0.8^4 - 4 \times 0.8^3 (1-0.8)}{10 \times 0.2 \times (1-0.8^5)}$$

$$= \cancel{0.1954}$$

0.196

$$D = \frac{p[1 - p^N - N p^{N-1} (1-p)]}{\mu(1-p)(1-p^{N+1})}$$

$$= \frac{0.8[1 - 0.8^4 - 4 \times 0.8^3 \times 0.2]}{10 \times 0.2 \times (1-0.8^5)}$$

$$= 0.1076$$