① Soal Restoran

$\lambda = 10$

$\mu = 9$

Jawab $\dfrac{\lambda}{P(\chi.1)} = \dfrac{10}{\mu.(9-10)} = \dfrac{10}{4(-6)} = \dfrac{10}{-0.24} = 9.6$

Karena wa lebih kecil dari 3 menit maka sistem tersebut dapat mencapai target

② Soal Koperba

$c = 3$ $\lambda = 10$ $\mu = 4$

$P_0 = \dfrac{1}{\left\{ \sum\limits_{n=0}^{n=c-1} \dfrac{1}{n!}\left(\dfrac{\lambda}{\mu}\right)^n \right\} + \dfrac{1}{c!}\left(\dfrac{\lambda}{\mu}\right)^c \left(\dfrac{c\mu}{c.\mu.\lambda}\right)}$

$P_0 = \dfrac{1}{\left\{ \dfrac{1}{0!}\left(\dfrac{10}{4}\right)^0 + \dfrac{1}{1!}\left(\dfrac{10}{4}\right)^1 + \dfrac{1}{2!}\left(\dfrac{10}{4}\right)^2 \right\} + \dfrac{1}{3!}\left(\dfrac{10}{4}\right)^3 \left(\dfrac{3.4}{3.4-10}\right)}$

$P_0 = 0.45$

$L = \dfrac{\lambda.\mu\left(\lambda/\mu\right)^c}{(c-1)!\left(c.\mu.\lambda\right)^2} \; P_0 + \dfrac{\lambda}{\mu}$

$= \dfrac{10 \times 4 \left(\frac{10}{4}\right)^3}{(3-1)!\,(3.4-10)^2} \; (0.43) + \dfrac{10}{4} = 6$

∴ Probabilitas tidak ada Pelanggan = 0.45

∴ Rata-rata Pelanggan dilayani = 6 menit

Soal Antrian

① $\lambda = 9$

$\mu = 2.5$

a) $L = \dfrac{\lambda}{\mu-\lambda} = \dfrac{9}{2.5-9} = \dfrac{9}{-1.5} = -2.16r$

b) $L_a = \dfrac{\lambda^2}{P(\mu.\lambda)} = \dfrac{9^2}{2.5\,(2.5-9)} = \dfrac{16}{-3.75} = -4.26$

c) $w_a = \dfrac{\lambda}{\mu\,(P.\lambda)} = \dfrac{9}{2.5\,(2.5-9)} = \dfrac{9}{-3.75} = -4.26$

d) $w = \dfrac{1}{\mu-\lambda} = \dfrac{1}{(2.5)-9} = \dfrac{1}{} = -0.16$

② $\lambda = 10$

$\mu = 3$

a) $P_n = \left(\dfrac{\lambda}{\mu}\right)^n = \dfrac{3}{10}^{\,o+1} = 0.3$

b) $E\,(m/n\,(0)) = \dfrac{\lambda}{\mu-\lambda} = \dfrac{10}{10-3} = \dfrac{10}{7} = 1.43$

③ $\mu = 90/jam$ $c = 3$ $S = 3$

$\lambda = 900$ Periode Puncak 8 jam

a) $900/8$

$= 112.5$

b) 90 orang / jam

1 Conter = 30 orang / jam

$$c)\ P_0 = \cfrac{1}{\left\{\sum\limits_{n=0}^{n=c-1} \frac{1}{n!}\left(\frac{\lambda}{\mu}\right)^n\right\} + \frac{1}{c!}\left(\frac{\lambda}{\mu}\right)^c\left(\frac{c\mu}{c\mu-\lambda}\right)}$$

$$= \cfrac{1}{\left\{\frac{1}{0!}\left(\frac{900}{90}\right)^0 + \frac{1}{1!}\left(\frac{900}{90}\right)^1 + \frac{1}{2!}\left(\frac{900}{90}\right)^2\right\} + \frac{1}{7!}\left(\frac{900}{90}\right)^3\left(\frac{3.90}{3.90-900}\right)}$$

$$= 7.6$$

$d)\ L_q = \dfrac{\lambda^2}{\mu(\mu-\lambda)} = \dfrac{900^2}{9(90-900)} = -0.1$

$e)\ L = \dfrac{\lambda}{\mu-\lambda} = \dfrac{900}{90-900} = -1.1$

$f)\ Wq = \dfrac{\lambda}{\mu(\mu-\lambda)} = \dfrac{\cdot 900}{90(90-900)} = -0.012$

$g)\ w = \dfrac{1}{\mu-\lambda} = \dfrac{1}{90-900} = -0,0001$

$h)\ \ell = \dfrac{\lambda}{\mu\cdot S} = \dfrac{900}{90\cdot 3} = \dfrac{900}{270} = 3.33$

④ $\lambda = 20$ mesin $\qquad \mathcal{T} = 5$ Jam

$\mu = 12$ menit

$a)\ r/\lambda = 20$

$b)\ L_q = \dfrac{\lambda^2}{\mu(\mu-\lambda)} = \dfrac{20^2}{12(12-20)} = \dfrac{400}{-96} = -4,16$

$c)\ Wq = \dfrac{L_q}{\lambda} = \dfrac{-4.16}{20} = 0,208$

$d)$ 1 mesin memperhatikan pengeselaian setiap 5 J.

$e)$ Jumlah mesin yang beroperasi adalah 19 karena 1 mesin akan berhenti untuk pengeselaian

$f)\ L = \dfrac{\lambda}{\mu\cdot\lambda} = \dfrac{20}{25\cdot 20} = \dfrac{20}{5} = 4$ mesin

$g)\ w = \dfrac{1}{\mu-\lambda} = \dfrac{1}{12-20} = \dfrac{1}{-8}$

$h)\ 1 = 1\cdot u$

$\qquad = 1 - \dfrac{\lambda}{\mu}$

$\qquad = 1 - \dfrac{20}{25} = -20$

Simulasi Monte Carlo

Permintaan	Probabilitas	Kumulatif Probabilitas	Interval Bilangan acak
4	6/50 = 0,12	0,12	0 - 12
5	5/50 = 0,1	0,22	13 - 22
6	9/50 = 0,18	0,4	23 - 40
7	12/50 = 0,24	0,64	41 - 64
8	8/50 = 0,16	0,8	65 - 80
9	7/50 = 0,14	0,94	81 - 94
10	8/50 = 0,16	1.00	95 - 99

minggu	Bilangan acak	Penjualan
1	10	4
2	24	6
3	3	4
4	32	6
5	23	6
6	39	7
7	95	10
8	39	6
9	24	6
10	51	7

minggu	Bilangan acak	Penjualan
11	8	4
12	98	7
13	66	8
14	97	10
15	3	4
16	96	10
17	46	7
18	79	8
19	77	8
20	94	7

1. Penjualan dispenser berjumlah 8 terjadi di periode 13, 18, 19

2. Rata-Rata Penjualan Perminggu = 135 /20 = 6,75

3. $\sum\limits_{i=0}^{10}$ ((Prob. Dispenser) x (Perm. Dispenser) + ... (.... x ....)

$= (0,12 \times) + (0,1 \times 5) + (0,18 \times 6) + (0,24 \times 7) + (0,16 \times 8) + (0,14 \times 9) + (0,66 \times 10)$

$= (0,48) + (0,5) + (1,08) + (1,68) + (1,20) + (1,26) + (0,6)$

$= 6,88$