③ $\lambda(t) = a\sin^2(\omega t) + b\cos^2(\omega t)$

$$\lambda = \int_0^{480} \lambda(t) \cdot dt$$

$a = 4$ customer/min ; $b = 1$ customer/min

$\omega = 0.05$ rad/min

$$P_{1247}(480) = \frac{(\lambda t)^m e^{-\lambda t}}{m!}$$

$$\lambda = \int_0^{480} 4\sin^2(\omega t) + \cos^2(\omega t) \cdot dt$$

$$= 4\int_0^{480} \sin^2(0.05 \times t) \cdot dt + \int_0^{480} \cos^2(0.05t) \cdot dt$$

$$\cos 2\theta = \cos^2\theta - \sin^2\theta$$
$$= 1 - 2\sin^2\theta$$

$$\Rightarrow \sin^2\theta = \frac{1 - \cos 2\theta}{2}$$

$$\cos 2\theta = 2\cos^2\theta - 1$$

$$\Rightarrow \cos^2\theta = \frac{1 + \cos 2\theta}{2}$$

$$\lambda = 4\int_0^{480} \frac{1-\cos(2\times 0.05\times t)}{2}\cdot dt + \int_0^{480} \frac{1+\cos(2\times 0.05\times t)}{2}\cdot dt$$

$$= 4\left[\left[\frac{t}{2}\right]_0^{480} - \left[\frac{\sin(0.1t)}{0.1\times 2}\right]_0^{480}\right]$$

$$+ \left[\left[\frac{t}{2}\right]_0^{480} + \left[\frac{\sin(0.1t)}{0.1\times 2}\right]_0^{480}\right]$$

$$= 4\left[(240-0) - \left(\frac{\sin(48)}{0.2} - \frac{\sin 0}{0.2}\right)\right]$$

$$+ \left[(240-0) + \left(\frac{\sin(48)}{0.2} - \frac{\sin 0}{0.2}\right)\right]$$

$$= 4\left[240 + 3.841\right] + \left[240 - 3.841\right]$$

$$= 975.364 + 236.159$$

$= 1211.523$

So, now we have to use this λ to compute,

$$P(0 \le N \le 1247) = \sum_{m=0}^{1247} \frac{(1211.523)^m e^{-1211.523}}{1247!}$$

$$= 0.8492$$

$$P(N > 1247) = 1 - 0.8492$$

$$= 0.1508$$