HW5-1

ESE 5030

HW5

① $$P_m(t) = \frac{e^{-\lambda t}(\lambda t)^m}{m!}$$

$t = 40$ min. ; $\lambda_M = 9$ men/hour ; $\lambda_F = 6$ women/hour

$= \frac{40}{60}$ hour

$= \frac{2}{3}$ hrs.

(a) $$P_5(t) = \frac{e^{-\lambda_M t}(\lambda_M t)^5}{5!}$$

$$= \frac{e^{-9\times 2/3}(9\times 2/3)^5}{5!}$$

$$= \frac{e^{-6}\,6^5}{5!}$$

$$= 0.1606$$ (confirm with calculator after charging)

$$P_3(t) = \frac{e^{-\lambda_F t}(\lambda_F t)^3}{3!}$$

$$= \frac{e^{-6\times 2/3}\,(6\times 2/3)^{3}}{3!}$$

$$= \frac{e^{-4}\,(4)^{3}}{6}$$

$$= 0.1953$$

$$P\left(\begin{array}{l}\text{5 men and 3 women arriving}\\ \text{in the next 40 minutes}\end{array}\right) = 0.1606 \times 0.1953$$

$$= 0.0313$$

(b) $$P_3(t) = \frac{e^{(-\lambda_M t)}\,(\lambda_M t)^{m}}{m!}$$

$$= \frac{e^{-(9\times 2/3)}\,(9\times 2/3)^{3}}{3!}$$

$$= \frac{e^{-6}\,6^{3}}{3!}$$

$$= 0.0892$$

$$P_{-}(t) = \frac{e^{(-\lambda_F t)}\,(\lambda_F t)^{m}}{}$$

$$= \frac{e^{-6\times 2/3} \; m! \; (6\times 2/3)^5}{5!}$$

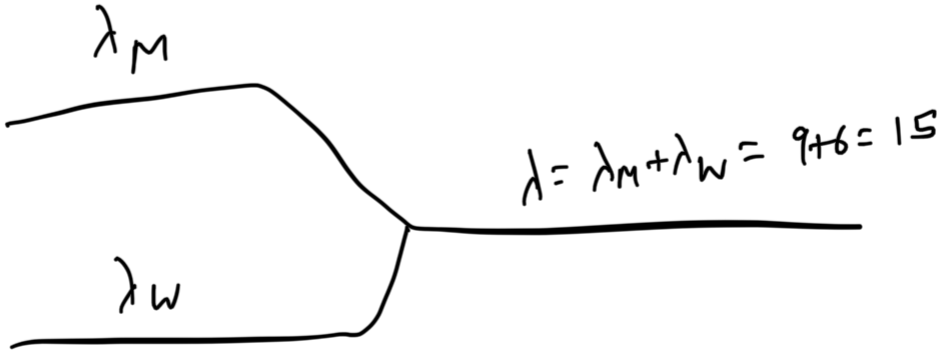
$$= \frac{e^{-4} \; 4^5}{5!}$$

$$= 0.1562$$

$$P(\text{3M \& 5W in 40 mins}) = 0.1562 \times 0.0892$$

$$= 0.0139$$

(c)



$$P_8(t) = \frac{e^{-\lambda t} \; (\lambda t)^8}{8!}$$

$$= \frac{e^{-15\times 2/3} \; (15\times 2/3)^8}{8!}$$

$$= \frac{e^{-10} \times 10^{8}}{8!}$$

$$= 0.1125$$