

MISI:

$$\#9) (a) {}_2q_{30} = 1 - {}_2p_{30} \quad {}_2p_{30} = p_{30} \cdot p_{31} = (.9)(.8) = .72$$

$$\therefore {}_2q_{30} = 0.28$$

$$(b) {}_2q_{34} = 1 - {}_2p_{34} \quad {}_2p_{34} = p_{34} \cdot p_{35} = (.5)(.4) = .2$$

$$\therefore {}_2q_{34} = 0.8$$

$$(c) {}_3q_{30} = 1 - {}_3p_{30} = 1 - \cancel{p_{30} \cdot p_{31} \cdot p_{32}}$$

$${}_3p_{30} = p_{30} \cdot p_{31} \cdot p_{32} = (.9)(.8)(.7) = .504$$

$$\therefore {}_3q_{30} = 0.496$$

$$(d) {}_3q_{34} = 1 - {}_3p_{34}$$

$${}_3p_{34} = p_{34} \cdot p_{35} \cdot p_{36} = (.5)(.4)(.3) = .06$$

$$\therefore {}_3q_{34} = 0.94$$

MISI:

$$\#20) e_{20} = P_{20} + {}_2P_{20} + {}_3P_{20} + \dots$$

$$q_{20} = \frac{1}{80} \Rightarrow P_{20} = \frac{79}{80}$$

$${}_2q_{20} = q_{20} + {}_1q_{20} = \frac{1}{80} + \frac{1}{80} = \frac{2}{80} \Rightarrow {}_2P_{20} = \frac{78}{80}$$

$${}_3q_{20} = q_{20} + {}_1q_{20} + {}_2q_{20} = \frac{1}{80} + \frac{1}{80} + \frac{1}{80} = \frac{3}{80} \Rightarrow {}_3P_{20} = \frac{77}{80}$$

⋮

$$\therefore e_{20} = \frac{79}{80} + \frac{78}{80} + \frac{77}{80} + \dots + \frac{1}{80} = \frac{1}{80} \cdot (1 + 2 + 3 + \dots + 79)$$

$$= \frac{1}{80} \cdot \left(\frac{79 \cdot 80}{2} \right) = 39.5$$

$$\#21) e_x = \int_0^{\infty} e^{-t} P_x dt = \int_0^{\infty} (.91)^t dt$$

$= \frac{1}{(.91)}$

$$e_{20} = P_{20} + {}_2P_{20} + {}_3P_{20} + \dots$$

$$= .91 + (.91)^2 + (.91)^3 + \dots$$

$$\underline{\text{geometric}} \quad \frac{.91}{1 - .91} = \frac{.91}{.09} = \frac{91}{9}$$

MISI:

$$\#26) e_{30} = P_{30} + 2P_{30} \cdot (1 + e_{32})$$

$$\Rightarrow 34.5 = \frac{69}{70} + \frac{69}{70} \cdot \frac{68}{69} \cdot (1 + e_{32})$$

$$\Rightarrow e_{32} = 33.5$$

$$\#28) e_x = P_x + 2P_x + 3P_x + 4P_x + 5P_x + \dots$$

$$= P_x + 2P_x + 3P_x + 3P_x \cdot P_{x+3} + 3P_x \cdot 2P_{x+3} + \dots$$

$$= P_x + 2P_x + 3P_x \cdot (1 + P_{x+3} + 2P_{x+3} + \dots)$$

$$\therefore e_x = P_x + 2P_x + 3P_x \cdot (1 + e_{x+3})$$