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Serial ; 6

Ans no 1

Trend value

Year	2008	2009	2010	2011	2012	2013
income	43	51	64	76	81	96

Year	Income	3 year total	3 year avg	Trend values
2008	43			
				52.67 - 10.55 = 42.11
2009	51	158	52.67	42.11 + 10.55 = 52.67
2010	64			52.67 + 10.55 = 63.22
2011	76			63.22 + 10.55 = 73.77
2012	81	253	84.33	73.77 + 10.55 = 84.32
2013	96			84.32 + 10.55 = 94.87

Difference between central years = 2012 - 2009

= 3

" " semi average = 84.33 - 52.67

= 31.66

increase in trend value = $\frac{31.66}{3}$ = 10.55

Ans no 3

The transition probability matrix

$$P = \begin{bmatrix} P_{00} & P_{01} \\ P_{10} & P_{11} \end{bmatrix} = \begin{bmatrix} 0.6 & 0.4 \\ 0.8 & 0.2 \end{bmatrix}$$

we need P_{00} in P^5

$$P^2 = \begin{bmatrix} 0.6 & 0.4 \\ 0.8 & 0.2 \end{bmatrix} \begin{bmatrix} 0.6 & 0.4 \\ 0.8 & 0.2 \end{bmatrix}$$

$$= \begin{bmatrix} 0.68 & 0.32 \\ 0.64 & 0.36 \end{bmatrix}$$

$$P^4 = \begin{bmatrix} 0.68 & 0.32 \\ 0.64 & 0.36 \end{bmatrix} \begin{bmatrix} 0.68 & 0.32 \\ 0.64 & 0.36 \end{bmatrix}$$

$$= \begin{bmatrix} 0.6672 & 0.3328 \\ 0.6656 & 0.3344 \end{bmatrix}$$

$$P^5 = \begin{bmatrix} 0.6672 & 0.3328 \\ 0.6656 & 0.3344 \end{bmatrix} \begin{bmatrix} 0.6 & 0.4 \\ 0.8 & 0.2 \end{bmatrix}$$

$$= \begin{bmatrix} 0.66656 & 0.33344 \\ 0.66688 & 0.33312 \end{bmatrix}$$

Required Probability is 0.66656

i) More than 1 minute

$$P(T>1) = e^{-\lambda t} = e^{-2\times 1} = 0.1353$$

ii) less than 2 minute

$$P(T<2) = 1 - e^{-\lambda t}$$

$$= 1 - e^{-2\times 2}$$

$$= 1 - e^{-4}$$

$$= 0.9816$$

iii) Between 1 to 2 minute

$$P(1<T<2) = e^{-\lambda t} - e^{-\lambda t_2}$$

$$= e^{-2\times 1} - e^{-2\times 2}$$

$$= e^{-2} - e^{-4}$$

$$= 0.1353 - 0.0183$$

$$= 0.117$$