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Serial: 16

Answer to the Q: No: 1

Calculate the trend value semi-average method.

Year	2008	2009	2010	2011	2012	2013
Income (incomes)	43	51	64	76	81	96

Ans:

Year	Income	3 Year Semi Total	3 Year Semi average	Trend value
2008	43	158	52.6	$52.6 - 10.56 = 42.04$
2009	51			$42.04 + 10.56 = 52.6$
2010	64			$52.6 + 10.56 = 63.16$
2011	76	253	84.3	$63.16 + 10.56 = 73.72$
2012	81			$73.72 + 10.56 = 84.28$
2013	96			$84.28 + 10.56 = 94.84$

Different between the central years =  $2012 - 2009$   
= 3

Difference between the semi-averages

$$= 84.33 - 52.67$$

$$= 31.66$$

Increase in trend value for one year

$$= \frac{31.66}{3}$$

$$= 10.56$$

Answer to the Q: No: 2

3-Year Moving ~~A~~ Average

Year	Youn	3 Year semitotal	3-Year Semi average
2004	40	---	---
2005	42	121	40.33
2006	39	106	35.33
2007	25	91	30.33
2008	27	103	34.333
2009	51	106	35.333
2010	28	105	25
2011	26	85	18.333
2012	31	87	29
2013	30	109	36.333
2014	48	---	---

Answer to the Q : 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  $P_{00}^5$  in  $P^5$

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

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

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

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

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

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

The required probability is  $= 0.66656$  Ans



4) 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 ~~to~~ 2 minute,

$$P(1 < T < 2) = e^{-\lambda t_1} - e^{-\lambda t_2}$$

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

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

$$= 0.1353 - 0.0183$$

$$= 0.117$$