

F.T. Assignment

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①

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

Year	Income	3 year semi total	3 year semi average	Trends value
2008	43	158	$\frac{158}{3} = 52.67$	$52.67 - 10.553 = 42.057$
2009	51			$42.057 + 10.553 = 52.67$
2010	64			$52.67 + 10.553 = 63.22$
2011	76	253	$\frac{253}{3} = 84.33$	$63.22 + 10.553 = 73.78$
2012	81			$73.78 + 10.553 = 84.33$
2013	96			$84.33 + 10.553 = 94.88$

Difference between central year.

$$2012 - 2009 = 3$$

Difference between semi-average

$$84.33 - 52.67 = 31.66$$

Increase in trend value for one year.

$$31.66 / 3 = 10.553$$

②

From given data values.

Year	Loan	3 years semi total	3 years semi average
2004	40	---	---
2005	42	121	40.33
2006	39	106	35.33
2007	25	91	30.33
2008	27	103	40.33
2009	51	106	35.33
2010	28	105	35
2011	26	85	28.33
2012	26 31	87	29
2013	30	109	36.33
2014	48	---	---

③ The transition matrix $P = \begin{bmatrix} P_{00} & P_{01} \\ P_{10} & P_{11} \end{bmatrix}$

$$= \begin{bmatrix} 0.6 & 0.4 \\ 0.8 & 0.2 \end{bmatrix} \text{ so we need } P_{00}^5$$

$$P^2 = \begin{bmatrix} 0.6 & 0.4 \\ 0.8 & 0.2 \end{bmatrix} \begin{bmatrix} 0.6 & 0.4 \\ 0.8 & 0.2 \end{bmatrix} = \begin{bmatrix} 0.68 & 0.32 \\ 0.64 & 0.36 \end{bmatrix}$$

$$P^4 = \begin{bmatrix} 0.68 & 0.32 \\ 0.64 & 0.36 \end{bmatrix} \begin{bmatrix} 0.68 & 0.32 \\ 0.64 & 0.36 \end{bmatrix} = \begin{bmatrix} 0.6672 & 0.3328 \\ 0.6656 & 0.3344 \end{bmatrix}$$

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

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

The probability that the customer will enter the shop from 8am to 2pm is 0.66656

④

Given $\lambda = 2$ per minute.

Probability of elapsed time between 10th & 11th mail

①

more than 1 minute

$$P(T > 1) = e^{-\lambda t} = e^{-2 \times 1} = 0.13534$$

② Less than 2 minute

$$P(T < 2) = 1 - e^{-\lambda t} = 1 - e^{-2 \times 2}$$
$$= 1 - 0.01832$$

$$= 0.9817$$

③ between 1 - 2 minutes.

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

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

$$= 0.13534 - 0.01832$$

$$= 0.11702$$