S.No. 4

Computational Statistics and Probability

Section [O]

Assignment 1
Finals

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① (i) 2008, 2009, 2010

3 years semi-total = 43 + 51 + 64
= 158

Semi-average = 158/2 = 79

(ii) 2011, 2012, 2013

76 + 81 + 96
= 253

semi average = 253/2
= 126.5

Trend values = 2008 − 79 − 15.8 = 63.2
2009 − 63.2 + 15.8 = 79
2010 − 79 + 15.8 = 94.8
2011 − 94.8 + 15.8 = 110.6
2012 − 110.6 + 15.8 = 126.4
2013 − 126.4 + 15.8 = 142.2

Difference between the central years =
2012 − 2009 = 3

Δ semi-averages = 47.5

Increase in trend for one year = 47.5/3
= 15.8

Years	2008	2009	2010	2011	2012	2013
Trend values	63.2	79	94.8	110.6	126.4	142.2

Ans

② (2)

Years	Loans	3y semi-total	3y semi average
2004	40	—	—
2005	42	121	40.33
2006	39	106	35.33
2007	25	91	30.33
2008	27	103	34.33
2009	51	106	35.33
2010	28	105	35
2011	26	85	28.33
2012	31	87	29
2013	30	109	36.33
2014	48	—	—

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③

$$P = \begin{bmatrix} 0.6 & 0.4 \\ 0.0 & 0.2 \end{bmatrix}$$

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

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

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

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

$$P^5 = \begin{bmatrix} 0.6672 & 0.3328 \\ 0.6656 & 0.3344 \end{bmatrix}\begin{bmatrix} 0.6 & 0.4 \\ 0.0 & 0.2 \end{bmatrix}$$

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

Probability of people entering the shop from 9-2pm = 0.66656 //

④ (i) $(T > 1\text{min}) \approx P(T>1) = e^{-\lambda t} = e^{-2\times 1} = 0.1353$

(ii) $(T < 2m) \approx$ ~~$P(T<2) =$~~

$$P(T<2) = -e^{-\lambda t} + 1$$
$$= 1 - e^{-4}$$
$$= 0.9816$$

(iii) $P(1 < T < 2)$

$$= e^{-\lambda t_1} - e^{-\lambda t_2}$$
$$= e^{-2} - e^{-4}$$
$$= 0.117$$