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16/ENG04/050
Elect/Elect
ENG 382 Assignment VI

t(hr)	d(m)
0	2
1	5
2	19
3	50
4	151
5	470
6	1485
7	4812
8	12936
9	41125
10	111021

$d = \alpha B^t$

$\log d = \log \alpha + \log B^t$

$\log d = \log \alpha + t \log B$

$y = a_0 + a_1 x$

$a_1 = \log B$

$a_0 = \log \alpha$

$y = \log d$

$\Sigma y = N a_0 + a_1 \Sigma x$ ——— (1)

$\Sigma xy = a_0 x + a_1 \Sigma x^2$ ——— (2)

Where $n = 6$

From the table

$\Sigma x = 55$

$\Sigma y = 29.413$

$\Sigma xy = 199.8264$

$\Sigma x^2 = 385$

$\Sigma y^2 = 103.962$

f(x)	d	log d(y)	xy	x^2	y^2
0	2	0.30103	0	0	6.096619
1	5	0.09899	0.69899	1	0.488559
2	19	1.278754	2.557507	4	1.635211
3	80	2.178933	5.09691	9	2.886469
4	181	2.672078	8.715908	16	4.747941
5	470	3.156852	13.36049	25	7.140107
6	1485	3.654369	18.94111	36	9.968714
7	4512	4.118	25.58058	49	13.13441
8	12936	4.614128	52.8974	64	16.9096
9	41125	4.614128	41.52622	81	21.28997
10	111021	5.043404	50.46405	100	25.46511
Σx	171726	29.41135	199.8264	385	103.962

$29.4113 = 11a_0 + 55a_1$ ——— (1)

$199.8269 = 55a_0 + 385a_0$ ——— (2)

$29.4113 - 55a_1 = 11a_0$

$a_0 = \frac{29.4113 - 55a_1}{11}$

$199.82692 = 35\left[\frac{29.41133 - 55a_1}{11}\right] + 385a_1$

$199.82692 = 5(29.41133 - 55a_1) + 385a_1$

$199.82692 - 147.03662 = 385a_1 - 267a_1$

$52.77025 = 110a_1$

$a_1 = \frac{52.77025}{110} = 0.4797$

$$\therefore a_0 = \frac{29.4113 - 55(0.4999)}{11}$$

$$= 0.2752$$

$a_0 = \log \alpha$

$\alpha = \log^{-1} a_0$

$\alpha = 1.8845$

$a_1 = \log B$

$B = \log^{-1} a_1$

$B = 3.0179$

Correlation coefficient $R = \frac{N\Sigma xy - (\Sigma x)(\Sigma y)}{\sqrt{[N\Sigma x^2 - (\Sigma x)^2][N\Sigma y^2 - (\Sigma y)^2]}}$

$$R = \frac{(11 \times 199.8209) - (55 \times 29.4133)}{\sqrt{[(11 \times 385) - 55]^2 [(11 \times 103.962) - 29.4133]}}$$

$R = 0.999846087$

d) From observation, it can be seen that $R^2 < R$