

Name: Tamilayo Aluko

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Assignment 6

t (hr)	d (m)
0	2
1	5
2	17
3	50
4	151
5	470
6	1435
7	4512
8	12936
9	41125
10	111021

$$y = \alpha \beta^t$$

\* take Log of both sides

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

where

$$y = a_0 + a_1 x$$

$$a_1 = \log \beta, \quad x = t, \quad a_0 = \log \alpha, \quad y = \log d$$

$$y x = a_0 x + a_1 x^2$$

$$\sum y = n a_0 + a_1 \sum x^2$$

$$\sum x y = a_1 \sum x + a_1 \sum x^2$$

where  $n = 11$

From the table

$$\sum x = 55$$

$$\sum y = 29.413$$

$$\sum x y = 197.8269$$

$$\sum x^2 = 385$$

$$\sum y^2 = 103.962$$

} Values gotten by using  
excel

$$29.41133 = 11a_0 + 55a_1 \quad \text{--- (1)}$$

$$199.8209 = 55a_0 + 385a_1 \quad \text{--- (2)}$$

$$29.41133 - 55a_1 = 11a_0$$

$$a_0 = \frac{29.41133 - 55a_1}{11} \quad \text{--- (3)}$$

Sub eqn (3) into eqn (2) ...

$$199.8209 = 55 \left( \frac{29.41133 - 55a_1}{11} \right) + 385a_1$$

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

$$199.82692 = 142.05662 - 275a_1 + 385a_1$$

$$199.8269 - 142.05662 = 385a_1 - 275a_1$$

$$52.77025 = 110a_1$$

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

$$110$$

$$a_1 = 0.4797$$

Sub  $a_1$  back into eqn (1)

$$a_0 = \frac{29.41133 - 55(0.4797)}{11}$$

$$11$$

$$a_0 = 0.2752$$

$$a_0 = \log \alpha$$

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

$$\alpha = \log^{-1} 0.2752$$

$$\alpha = 1.8845$$

$$a_1 = \log \beta$$

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

$$\beta = \log^{-1} 0.4797$$

$$\beta = 3.0179$$

$$\text{Correlation Coefficient } R = \frac{N \sum xy - (\sum x)(\sum y)}{\sqrt{(N \sum x^2 - (\sum x)^2)(N \sum y^2 - (\sum y)^2)}}$$

$$R = \frac{(11 \times 199.8209) - (55 \times 29.41133)}{\sqrt{((11 \times 385) - 55)^2 ((11 \times 103.962) - 29.41133)^2}}$$

$$R = 0.9998460887$$

$$R^2 = (0.9998460887)^2$$

$$R^2 = 0.9996922011$$

$$R = 0.9998$$

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Our calculation above suggests that  $R^2 < R$  because the value of the square of the correlation is lower than the correlation coefficient.