

CIVIL CLIMATE 101

10100031030

MECHANICAL ENGINEERING

ASSIGNMENT 6

$$d = x \rho^k$$

taking log of both sides

$$\log d = k \log \rho + \log x$$

$$\log d = \log x + k \log \rho$$

Comparing with the general equation

$$y = a_0 + a_1 x$$

Given:

t (hr)	d (m)
0	2
1	5
2	19
3	50
4	151
5	470
6	1435
7	4512
8	12936
9	41125
10	111021

From the equation formulated above

$$y = \log d$$

$$x = t$$

$$a_0 = \log x$$

$$a_1 = \log \rho$$

Spring Manual

x	t	dem	Y (log dem)	X ²	X ²	Y ²
	0	2	0.30103	0	0	0.090619
	1	5	0.69897	0.69897	1	0.488559
	2	19	1.278154	2.557507	4	1.635211
	3	50	1.69897	5.09691	9	2.886499
	4	151	2.178977	8.715903	16	4.741941
	5	470	2.672098	13.36049	25	7.446109
	6	1436	3.156852	18.94111	36	9.95714
	7	4512	3.654369	25.58058	49	13.35441
	8	12934	4.1115	32.8944	64	16.9069
	9	41125	4.614106	41.32695	81	21.28999
	10	111021	5.045405	50.45405	100	25.45611
Sum	55		29.41133	199.8269	385	103.902

$$EY = 20N + 21Ex$$

$$29.4113 = 1120 + 5521 \quad \dots (1)$$

$$2150$$

$$ExY = 20Ex + 21Ex^2$$

$$199.8269 = 5520 + 38521 \quad \dots (2)$$

Multiplying equ (1) by 5

$$147.0565 = 5520 + 27521 \quad \dots (3)$$

Subtracting equ 3 from 2.

$$52.7704 = 0 + 11021$$

$$21 = 52.7704$$

$$110$$

$$21 = 0.4797$$

Continuity in time (2)

$$199.8269 = 5280 + 585(0.4797)$$

$$Q_0 = \frac{199.8269 - 184.1345}{52}$$

$$Q_0 = \frac{15.1924}{52}$$

$$Q_0 = 0.2922$$

$$Y = 0.2922 + 0.4797X$$

~~Correlation Coefficient~~

Recall

$$\log x = 20$$

$$x = \log^{-1}(0.2922)$$

$$x = 1.9597$$

Also

$$\log \beta = 21$$

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

$$\beta = 3.0179$$

Correlation Co-efficient

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

$$R = \frac{(11 \times 199.8269) - (55 \times 29.41133)}{\sqrt{(11 \times 385 - 55)^2 (11 \times 25.145611 - 29.41133)^2}}$$

+

$$R = \frac{(2198.0959) - (1617.12315)}{\sqrt{(4180)^2 + (114.1707)^2}}$$

$$R = 0.9998$$

$$R^2 = 0.9997 \quad (i.e. R^2)$$