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Assignment 6

16/ENG02/047

COMPUTER ENGINEERING

ENG 382

Given: $d = \alpha\beta$ —— (1)

Comparing eqn(1)

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

where $a_0 = \log \alpha$

$a_1 = \log \beta$

	$Y = \log \alpha$	x	xY	d(cm)	x^2	Y^2
1.	0.30102996	0	0	0	0	0.09061905
2.	0.69897005	1	0.698970	1	1	0.488559067
3.	1.278753601	2	2.557507	2	4	1.635210742
4.	1.69897005	3	5.096910	3	9	2.886409076
5.	2.178976947	4	8.759907	4	16	4.749940537
6.	2.672097858	5	13.36104	5	25	7.140106262
7.	3.158519091	6	18.95114	6	36	9.965713925
8.	3.654369091	7	25.5805	7	49	13.35441349
9.	4.111800007	8	32.89440	8	64	16.9068993
10.	4.614165111	9	41.5269	9	81	21.28997386
11.	5.045605135	10	50.454051	10	100	25.45611297

$\Sigma Y = 29.41137046$

$\Sigma X = 55$

$\Sigma XY = 199.8268839$

$\Sigma X^2 = 385$

$\Sigma Y^2 = 103.9620455$

$\Sigma Y = a_0 N + a_1 \Sigma X$

$29.41137046 = a_0(11) + a_1(55)$ ——(1)

$\Sigma XY = a_0 \Sigma X_1 + a_1 \Sigma X^2$

$199.8208839 = a_0(55) + a_1(385)$ ——(2)

solving eqn (1) & (2)

$29.41133046 = 11a_0 + 55a_1$

$199.8268839 = 55a_0 + 385a_1$

$$a_0 = \frac{\begin{vmatrix} 29.41133046 & 55 \\ 199.8268839 & 385 \end{vmatrix}}{\begin{vmatrix} 11 & 55 \\ 55 & 385 \end{vmatrix}}$$

$$= \frac{(29.411330246)(385) - (55)(199.8268837)}{(11 \times 385) - (55 \times 55)}$$

$a_0 = 0.27511$

$$a_1 = \begin{vmatrix} 11 & 29.411330246 \\ 55 & 199.8268835 \end{vmatrix}$$

$$\begin{vmatrix} 11 & 55 \\ 55 & 385 \end{vmatrix}$$

$$a_1 = \frac{(11 \times 199.8268835) - (29.411330246 \times 55)}{[(11)(385)] - [55 \times 55]}$$

$a_1 = 0.47973$

$\therefore$ $a_0 = \log \alpha$

$0.2701 = \log \alpha$

$\alpha = 1.8841$

$a_1 = \log \beta$

$0.47973 = \log \beta$

$\beta = 3.0181$

$\alpha = 1.8841$

$\beta = 3.0181$

Correlation Coefficient

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

$$R = \frac{(11 \times 199.8268839) - (55)(29.41133046)}{\sqrt{(11 \times 385 - 55^2) - [(11 \times 103.9425685 - (29.41133046)^2]}}$$

$$R = 0.999844831 2$$

$$R^2 = (0.999844831 2)^2$$

$$= 0.999689684$$

For manual method,

$R = 0.999844831 2$

$R^2 = 0.999689684$

For Mat Lab

$R = 0.9998$

$R^2 = 0.9997$

For Excel,

$R = 0.9998448323575 3$

$R^2 = 0.9996896887922 57$

From observation for all the methods used to solve the correlation coefficient and its square, it can be seen that $R^2 < R$.