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16/Eng02/014
COMPUTER ENGINEERING

Given $d = \alpha \beta^t$ ——— ①

Comparing eqn ① to $y = a_0 + t a_1$

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

where $a_0 = \log \alpha$

$a_1 = \log \beta$

	$Y = \log d$	$t = x$	xY	d	x^2	Y^2
1	0.301029996	0	0	0	0	0.09061905
2	0.698970004	1	0.698970004	1	1	0.488559067
3	1.278753601	2	2.557507202	2	4	1.635210772
4	1.698970004	3	5.096910013	3	9	2.886469071
5	2.178976947	4	8.715907789	4	16	4.747940537
6	2.672097858	5	13.36048929	5	25	7.140106962
7	3.156851909	6	18.9411141	6	36	9.965713925
8	3.654369091	7	25.58058364	7	49	13.35441345
9	4.111800007	8	32.8944006	8	64	16.9068993
10	4.61416391	9	41.5269532	9	81	21.28997336
11	5.045405135	10	60.45405135	10	100	25.45611297

$\Sigma Y = 29.41133046$

$\Sigma x = 55$

$\Sigma xY = 199.8268839$

$\Sigma x^2 = 385$

$\Sigma Y^2 = 103.9620485$

$\Sigma y = a_0 N + a_1 \Sigma x$

$29.41133046 = a_0(11) + a_1(55)$ ——— ②

$\Sigma xY = a_0 \Sigma x_1 + a_1 \Sigma x^2$

$199.8268839 = a_0(55) + a_1(385)$ —— (2)

Solving eqn (i) and (ii)

$29.41133046 = 11a_0 + 55a_1$

$199.8268839 = 55a_0 + 385a_1$

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

$$a_0 = \frac{(29.41133046)(185) - (55)(199.8268839)}{(11 \times 385) - (55 \times 55)}$$

$a_0 = 0.27511$

$$a_1 = \frac{\begin{vmatrix} 11 & 24.41133046 \\ 55 & 199.8268835 \end{vmatrix}}{\begin{vmatrix} 11 & 55 \\ 55 & 385 \end{vmatrix}}$$

$$a_1 = \frac{(11 \times 199.8268835) - (29.41133046 \times 55)}{(11 \times 385) - (55 \times 55)}$$

$a_1 = 0.47973$

$a_0 = \log \alpha$

$0.27511 = \log \alpha$

$\alpha = 1.8841$

$a_1 = \log \beta$

$0.47973 = \log \beta$

$\beta = 3.0181$

$\alpha = 1.8841$

$\beta = 3.0181$

Correllation Coefficient.

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

$$R = \frac{(11 \times 199.82688397) - (55)(29.41133046)}{\sqrt{(11 \times 385 - 55^2) \times [11 \times 103.9620483 - (29.41133046)^2]}}$$

$R = 0.9998448312$

$R^2 = (0.9998448312)^2$

$= 0.9996896864$

For manual method;

$R = 0.9998448312$

$R^2 = 0.9996896864$

For MATLAB;

$R = 0.9998$

$R^2 = 0.9997$

For Excel;

$R = 0.99984483235763$

$R^2 = 0.9996896887922257$

From the Methods used to solve for the correllation Coefficient above and it's square, it can be seen that $R^2 < R$ which means the value of the square is less than the actual value of the correllation coefficient.

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