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MECHANICAL ENG
ENG MATHS - ENG 382

Given $d = \alpha \beta t$ — — — — (1)

Comparing eqn (1) + $y = mx + c$

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

where $a_0 = \log \alpha$

$a_1 = \log \beta$

	$Y = \log d$	$t = x$	xY	$d(m)$	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	2.886499076
5	2.178976947	4	8.715907789	4	16	4.747940537
6	2.672097858	5	13.36048929	5	25	7.140106962
7	3.1568519091	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	4.614165911	9	41.5269532	9	81	21.28997336
11	5.045405135	10	50.45405135	10	100	25.4561129[illegible]

$\Sigma Y = 29.41133046$

$\Sigma x = 55$

$\Sigma xY = 199.8268839$

$\Sigma X^2 = 385$

$\Sigma Y^2 = 103.9620485$

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

$29.41133046 = a_0(11) + a_1(55)$ — — — 1

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

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

Saving Eqn 1 and 2

$29.41133046 = 11a_0 + 55a_1$

$199.8268839 = 55a_0 + 385a_1$

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

$$= \frac{[29.41133046][385] - [55][199.8266839]}{[11 \times 385] - [55 \times 55]} = 0.27511$$

$$a_1 = \frac{\begin{vmatrix} 11 & 29.41133046 \\ 55 & 199.8268835 \end{vmatrix}}{\begin{vmatrix} 11 & 55 \\ 55 & 385 \end{vmatrix}}$$

$$= \frac{[11 \times 199.8268835] - [29.41133046 \times 55]}{[11 \times 385] - [55 \times 55]}$$

$a_1 = 0.47973$

$a_0 = \log \alpha$

$0.27511 = \log \alpha$

$\alpha = 1.8841$

$a_1 = \log \beta$

$0.47973 = \log \beta$

$\beta = 3.0181$

$\alpha = 1.8841$

$\beta = 3.0181$

d Correlation Co-efficient

$$R = \frac{N\Sigma XY - [\Sigma X][\Sigma Y]}{\sqrt{(N\Sigma X^2 - (\Sigma X^2)][N\Sigma Y^2 - (\Sigma Y)^2]}}$$

$$R = \frac{[11 \times 199.8268839] - [55 \times 29.41133046]}{\sqrt{[11 \times 385 - 55^2] \times [11 \times 103.9620485] - [29.41133046]^2}} = \cancel{0.9998448312}$$

~~R square~~ = R = 0.9998448312

R square = $[0.9998448312]^2 = 0.9996896864$

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 = 0.999689688792257

d from observation for all the methods used to solve the correlation coefficient and it's square, it can be seen that $R^2 <$ R [1.0 the value of the square of the correlation coefficient is lesser than the actual value of the correlation coefficient