

ORIGINWENSE OSASUYI ERWESI

16/ENG061061 ENG382 TECHNICAL EDUCATION

Given  $d = a \cdot b^t$

Comparing eqn ① to  $y = mx + c$

$\log y = \log a + t \log b$

Where  $a_0 = \log a$

$a_1 = \log b$

$y = \log d$

	$y = \log d$	$t = x$	$xy$	$d(\text{cm})$	$x^2$	$y^2$
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	1.635260772
4)	1.698970004	3	5.096910003	3	9	2.886499076
5)	2.178976947	4	8.715907789	4	16	4.747940539
6)	2.672097858	5	13.36048929	5	25	7.140106962
7)	3.1568519091	6	18.9411142	6	36	9.965713925
8)	3.654369091	7	25.58058364	7	49	13.35441345
9)	4.111800007	8	32.89440006	8	64	16.8541345
10)	4.614163911	9	41.5269532	9	81	21.28997336
11)	5.045405135	10	50.45405135	10	100	25.4611297

$\sum y = 29.4113046$

$\sum x = 55$

$\sum xy = 199.8268889$

$\sum x^2 = 385$

$\sum y^2 = 103.9620485$

$\sum y^2 = 9 \cdot 0 + 9 \cdot \sum x$

$29.41133046 = 9 \cdot 0 + 9 \cdot (55)$

$\sum xy = a_0 \sum x + a_1 \sum x^2$

$$199.8268829 = a_0(55) + a_1(385) \dots (2)$$

Solving eqn (1) and eqn (2)

$$29.4113046 = 11a_0 + 55a_1$$

$$199.8268839 = 55a_0 + 385a_1$$

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

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

$$a_0 = 0.27511$$

$$a_1 = \begin{vmatrix} 11 & 29.41133046 \\ 55 & 199.8268839 \end{vmatrix}$$

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

$$a_1 = \frac{(11 \times 199.8268839) - (29.41133046 \times 55)}{(11 \times 385) - (55 \times 55)}$$

$$a_1 = 0.47973$$

$$a_1 = \log \beta$$

$$a_0 = \log \alpha$$

$$0.47973 = \log \beta$$

$$0.27511 = \log \alpha$$

$$\beta = 3.0181$$

$$\alpha = 1.841$$

$$\alpha = 1.8341 \quad \beta = 3.0181$$

d) Correlation Coefficient

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

$$R = \frac{(11 \times 199.8268839) - 55(29.41133046)}{\sqrt{(11 \times 385 - 55^2)} \times \sqrt{(11 \times 103.9620485 - (29.4113046)^2)}}$$

$$R = 0.9998448312$$

$$R_{\text{square}} = (0.9998448312)^2$$

$$= 0.9996896867$$

For Manual Method

$$R = 0.999844812$$

$$R^2 = 0.9996896864$$

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 its square, it can be seen that  $R^2 < R$  i.e. the value of the square of the Correlation Coefficient is lesser than the actual value of the Correlation Coefficient.