Ndubuisi Diwne
171ENG021089
ENG 382
Computer Engineering

Given $d = \alpha\beta^t$ — ①

Comparing eqt ① to $y = mx + c$

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

where; $a_0 = \log\alpha$

$a_1 = \log\beta$

$y = \log d$	$t = x$	xy	d(m)	x^2	y^2
0.3010299956	0	0	0	0	0.09061905
0.698970004	1	0.698970004	1	1	0.488559067
1.278753601	2	2.557507202	2	4	1.635210772
1.698970004	3	5.096910013	3	9	2.886499076
2.178976947	4	8.715907789	4	16	4.747940537
2.672097858	5	13.36048929	5	25	7.140106962
3.1568519091	6	18.9411142	6	36	9.965713925
3.654369091	7	25.58058364	7	49	13.35441345
4.111800007	8	32.89440006	8	64	16.9068993
4.614163911	9	41.5269532	9	81	21.28997336
5.045405135	10	50.45405135	10	100	25.4611297

$\Sigma y = 29.41133046$

$\Sigma x = 55$

$\Sigma xy = 199.8268839$

$\Sigma x^2 = 385$

$\Sigma y^2 = 103.9620485$

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

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

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

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

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solving eqn ① and eqn ②

$29.4113046 = 11a_0 + 55a_1$

$199.8268839 = 55a_0 + 385a_1$

$$a_0 = \frac{\begin{vmatrix} 29.41133046 & 55 \\ 199.5268839 & 385 \end{vmatrix}}{\begin{vmatrix} 11 & 55 \\ 55 & 385 \end{vmatrix}}$$

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

$a_0 = 0.27511$

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

$$a_1 = \frac{(11 \times 199.8268835) - (29.41133046 \times 55)}{(11 \times 385) - (58 \times 55)}$$

$a_1 = 0.47973$

$a_0 = \log \alpha$

$0.27511 = \log \alpha$

$\alpha = 1.8841$

$a_1 = \log \beta$

$0.47973 = \log \beta$

$\beta = 3.0181$

$\alpha = 1.8841$

$\beta = 3.0181$

Correlation Co-efficient

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

$$R = \frac{(11 \times 199.8268839) - 55(29.41133046)}{\sqrt{(11 \times 385 - 55^2) \times [11 \times 103.9620485 - (29.4133046)^2]}}$$

$R = 0.9998448312$

$R_{square} = (0.999844312)^2$

$= 0.9996896864$

For manual method

$R = 0.999844831 2$

$R^2 = 0.9996896864$

For mat lab;

$R = 0.9998$

$R^2 = 0.9997$

For excel,

$R = 0.999844832357 63$

$R^2 = 0.999689688792257$

(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.