Michael Shallongwa
16/Eng01/019
Chemical Engineering
Maths assignment 6

$d = \alpha \beta$ ---- (i)

Comparing equn (i) to $y = mx + c$

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

$a_0 = \log \alpha$ & $a_1 = \log \beta$ ---- (ii)

$y = \log d$	$t = x$	xy	$d(m)$	x^2	y^2
0.3010299.6	0	0	0	0	0.09061905
0.69897004	1	0.6989704	1	1	0.488559067
1.27815 3601	2	2.55750	2	4	1.63521 0772
1.69897009	3	5.096910	3	9	2.88649976
2.178 47 6947	4	8.71590	4	16	4.74794 0537
2.67209 7850	5	13.36049	5	25	7.14010 6962
3.15 68519091	6	18.94111	6	36	9.96713925
3.15 43609011	7	25.58054	7	49	13.35441345
4.11180 0007	8	37.89440	8	64	16.9068993
4.61 41 63911	9	44.52695	9	81	21.28997336
5.04 5459 35	10	50.05005	10	100	25.4611297

$\Sigma Y = 29.911330 46$, $\Sigma x = 55$, $\Sigma xY = 199.8268839$

$\Sigma x^2 = 385$, $\Sigma Y^2 = 103.9620485$

$\Sigma y^2 = a_0 N + a_1 \Sigma x$

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

$\Sigma xy = a_0 \Sigma x_0 + a_1 \Sigma x^2$

$199.87688 39 = a_0(55) + a_1(385)$

from equn (i) & (ii)

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

$$= \frac{(29.411330468 \times 385) - (55 \times 199 \times 8768538)}{(11 \times 385) - (55 \times 55)}$$

$a_0 = 0.77511$

$$a_1 = \frac{\begin{vmatrix} 11 & 29.411330468 \\ 55 & 199.8768538 \end{vmatrix}}{\begin{vmatrix} 11 & 55 \\ 55 & 385 \end{vmatrix}}$$

$a_1 = 0.27973$

$\therefore a_1 = \log\beta \quad \because a_0 = 0.27511$

$\beta = 3.0281 \qquad a_0 = \log\alpha$

$\alpha = 1.8841$

Correlation Coefficient

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

$R = 0.999844831 2$

$R_{square} = 0.999689686 4$

Manual method :- $R = 0.999844831 2$, $R^2 = 0.999689686$

Mathlab :- $R = 0.9998$, $R^2 = 0.9997$

excel :- $R = 0.9998448$, $R^2 = 0.999689689$

from all the methods used to solve the correlation, $R^2 < R$ in all the method used.