| t(hr) | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| d(m) | 2 | 5 | 19 | 50 | 151 | 470 | 1435 | 4512 | 12936 | 41125 | 111021 |

$$d = \alpha\beta^t$$
$$\ln d = \ln\alpha + \ln\beta^t$$
$$\ln d = \ln\alpha + t\ln\beta$$
$$y = a_0 + a_1 x$$
$a_0 = \ln\alpha \quad a_1 = \ln\beta \quad y = \ln d \quad t = x$

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

| $y = \ln d$ | $x = a_0$ | $xy$ | $x^2$ | $y^2$ |
|---|---|---|---|---|
| 0.693142 | 0 | 1.609437 | 0 | 0.4804 |
| 1.609457 | 1 | 5.8889 | 1 | 2.57107 |
| 2.944438 | 2 | 11.7360 | 4 | 8.66972 |
| 3.912023 | 3 | 20.669 | 9 | 15.30392 |
| 5.017279 | 4 | 30.764 | 16 | 25.1731 |
| 6.152732 | 5 | 43.6135 | 25 | 37.85612 |
| 7.268920 | 6 | 58.9015 | 36 | 52.8372 |
| 8.414495 | 7 | 75.742 | 49 | 70.80374 |
| 9.067769 | 8 | 95.6193 | 64 | 89.63866 |
| 10.62437 | 9 | 116.177 | 81 | 112.8773 |
| 11.61747 | 10 | | 100 | 135.0084 |
| 67.7221 | 55 | 460.118 | 385 | 551.2338 |

$$67.7221 = 11 \times a_0 + 55 \times a_1$$
$$460.118 = 55 a_0 + 385 a_1$$
Using simultaneous eqn.

Q6

$a_0 = 0.6334$

$a_1 = 1.1046$

$a_0 = \ln \alpha$

$a_0 = \ln \alpha_{a_0 k_1}$

$\alpha = e^{a_0}$

$\alpha = e^{0.6334}$

$\alpha = 1.8840$

$a_1 = \ln \beta$

$\beta = e^{a_1}$

$\beta = e^{1.1046}$

$\beta = 3.0144$

$d = 1.8840(3.0144)^t$

Correlation coefficient

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

$$R = \frac{11 \times 460.118 - 55 \times 67.722}{\sqrt{(11 \times 385 - 55^2) \times (11 \times 551.234) - (67.7221)^2}}$$

$$R = 0.99984$$

$$R^2 = (0.99984)^2 = 0.99968$$

for matlab:

$R = 0.9998$

$R^2 = 0.9997$

For observation for all the methods used to solve the correlation coefficient and its square, it can be seen that $R^2 < R$ the value of the square of the correlation coefficient is lesser than the actual value of the correlation