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16/ENG04/087

Electrical Electronics

ENG 382

$t(\text{hr})$	$d(\text{cm})$	$y(\text{Ind})$	$x=1$	$xy$	$x^2$	$y^2$
0	2	0.693117	0	0	0	0.48045
1	5	1.609437	1	1.609437	1	2.669721
2	19	2.944438	2	5.8889	4	15.30392
3	50	3.912028	3	11.7360	9	25.1131
4	151	5.017279	4	20.669	16	37.85619
5	478	6.152732	5	30.764	25	52.8372
6	1435	7.268920	6	43.6135	36	70.80376
7	4512	8.414495	7	58.9015	49	89.6366
8	12936	9.467769	8	75.742	64	112.872
9	41125	10.62437	9	95.6173	81	112.8772
10	111021	11.61747	10	116.177	100	134.9656

$$d = \alpha \beta^t$$

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

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

$$y = a_0 + a_1 x$$

$$a_0 = \ln \alpha, a_1 = \ln \beta, y = \ln d, x = t$$

$$\sum y = 67.7221$$

$$\sum x^2 = 385$$

$$\sum x = 55$$

$$\sum xy = 460.118$$

$$\sum y^2 = 551.2338$$

$$67.7221 = 11a_0 + 55a_1$$

$$460.118 = 55a_0 + 385a_1$$

Solving Simultaneously

$$a_0 = 0.6334$$

$$a_1 = 1.1046$$

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

$$r = \frac{11 \times 460.118 - 55 \times 67.722}{\sqrt{(11 \times 385.55)(11 \times 551.234) - (67.720^2)}}$$

$$r = 0.9984$$

$$r^2 = (0.9984)^2 = 0.9968$$

In conclusion the  $R^2 < 1$