

Assignment#4

Curve Fitting: Regression

1. The following values of x and y are supposed to follow the law $y = ax^2 + b \log_{10} x$. Find the most probable values of the constants a & b .

x	2.85	3.88	4.66	5.69	6.65	7.77	8.67
y	16.7	26.4	35.1	47.5	60.6	75.5	93.4

2. Convert following equations to its linear form & write the formula to calculate the value of constants:

a. Laws Containing Two Constants

- i. Straight Line Model: $y = ax + b$
- ii. Population Growth Model: $y = ae^{bx}$
- iii. Exponential Model: $y = ab^x$
- iv. Power Function Model: $y = ax^b$ | $y = kx^m$
- v. Gas Equation Model: $pv^r = k$, r & k are constants
- vi. $y = a + b\sqrt{x}$
- vii. $y = \log_e(ax + b)$
- viii. $y = ax/(b + x)$
- ix. $y = Ce^{Ax}$
- x. $xy^a = b$
- xi. $y = a + bx^2$
- xii. $y = ax + bx^2$
- xiii. $y = ax + b/x$
- xiv. $y = b/x + ax^2$
- xv. $x = ay + b$

b. Laws Containing Three Constants

- i. $y = a + bx + cx^2$
- ii. $y = a + bx^c$
- iii. $y = a + be^{cx}$
- iv. $y = ax + b + c/x$

3. The following data are provided; use least square method to fit these data with the following model: $y = ae^{bx}$

x	1.0	1.5	2.0	2.5	3.0	3.5	4.0
y	8.2	5.2	3.1	2.5	1.7	1.6	1.4

4. The temperature of a metal strip was measured at various time intervals during heating and the values are given in the table below:

Time, t (min)	1	2	3	4
Temp, T (°C)	70	83	100	124

If the relationship between the temperature T and time t is of the form: $T = be^{t/4} + a$ Estimate the temperature at $t = 6$ min.

5. Fit the regression plane for the data below:

x1	5	4	3	2	1
x2	3	-2	-1	4	0
y	15	-8	-1	26	8