

# 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.