Unit-7

Curve fitting

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* Fitting straight line by least square method.

$$y = a + bx.$$

$$\sum y = na + b\sum x$$
$$\sum xy = a\sum x + b\sum x^2$$

n = number of values in table

* Second degree Parabola by least square method.

$$y = a + bx + cx^2$$

$$\sum y = na + b\sum x + c\sum x^2$$
$$\sum xy = a\sum x + b\sum x^2 + c\sum x^3$$
$$\sum x^2y = a\sum x^2 + b\sum x^3 + c\sum x^4$$

n = number of values table.

* Curves reducible to linear law:-

$$Y = mX + C.$$

① $y = mx^n + C$ then
$x^n = X$, $y = Y$ so,
$Y = mX + C.$

② $y = ax^n$, take $\log_{10}$
$\log_{10} y = \log_{10} a + \log_{10} x^n$

$\log_{10} y = \log_{10} a + n\log_{10} x$

$\log_{10} y = Y$, $\log_{10} x = X$,
$\log_{10} a = C.$

$Y = mX + C.$

③ $y = ax^n + b\log x$,
$\frac{y}{\log x} = a\frac{x^n}{\log x} + b$,
$\frac{x^n}{\log x} = X$, $\frac{y}{\log x} = Y$, $a = m$, $b = C$.
$Y = mX + C.$

④ $y = ae^{bx} \Rightarrow \log_{10} y = x(b\log_{10} e) + \log_{10} a.$
$\log_{10} y = Y$, $x = X$, $m = b\log_{10} e$, $c = \log_{10} a$.
$Y = mX + c.$

⑤ $xy = ax + by \Rightarrow y = b\frac{y}{x} + a.$
$y = Y$, $\frac{y}{x} = X$, $b = m$, $a = c.$
$Y = mX + c.$

It is a manlike to punish but God like to forgive.