Curve Fitting

Given a set of data:

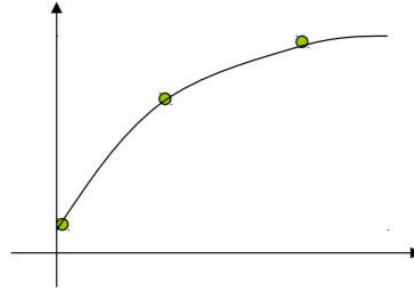| x	0	1	2
y	0.5	10.3	21.3
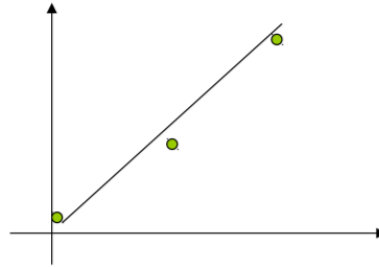
Select a curve that best fits the data. One choice is to find the curve so that the sum of the square of the error is minimized.

Given a set of data:

x_i	0	1	2
y_i	0.5	10.3	15.3

Find a polynomial $P(x)$ whose graph passes through all tabulated points.

$$y_i = P(x_i) \quad if \ x_i \ is \ in \ the \ table$$

Lecture No 42 Topic: Methods for Curve Fitting

o Least Squares

o Linear Regression

o Nonlinear Least Squares Problems

o Interpolation o Newton Polynomial Interpolation

o Lagrange Interpolation

Integration

Some functions can be integrated analytically:

$$\int_{1}^{3} x\,dx = \frac{1}{2}x^{2}\Big|_{1}^{3} = \frac{9}{2} - \frac{1}{2} = 4$$

But many functions have no analytical solutions :

$$\int_{0}^{a} e^{-x^{2}}\,dx = ?$$

Methods for Numerical Integration

o Upper and Lower Sums

o Trapezoid Method

o Romberg Method

o Gauss Quadrature