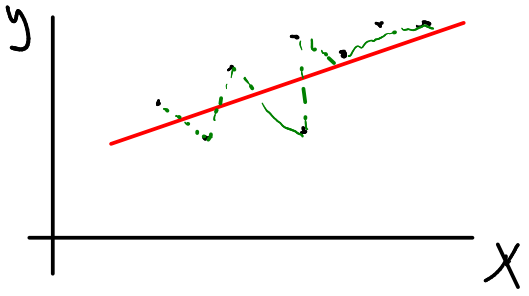
A bit of Function approximation

Linear regression

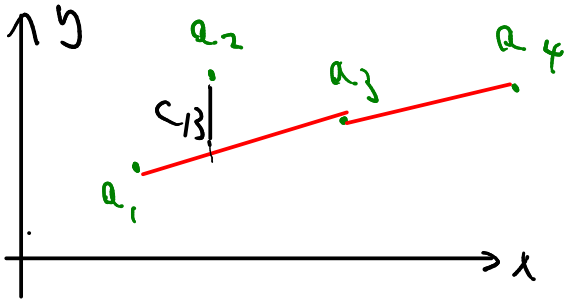


In our applications

C^* cost per point used for interpolation

e.g.

$3C^*$



C_{ij} cost of dropping point from i to j

C_{13}

Total cost $= 3C^* + C_{13}$

Let $q_i(x_1, y_1)$ and $q_i = (x_i, y_i)$

What is the equation of a straight line from q_i to q_j

In general for any straight line

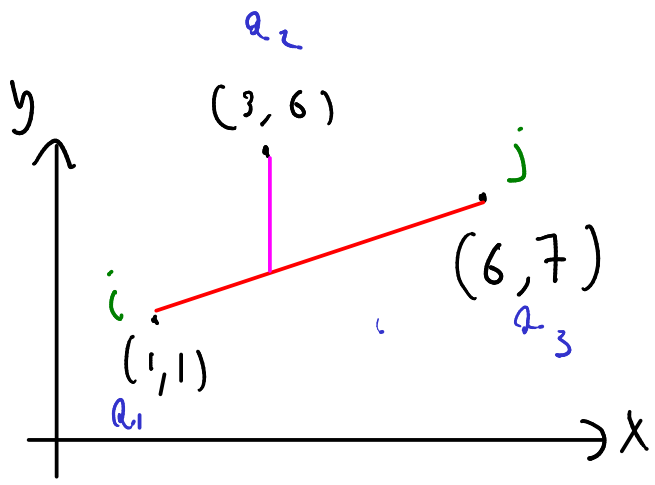
$y = ax + b$

$y_i = ax_i + b$

$$a = \frac{y_j - y_i}{x_j - x_i}$$

$$b = y_i - \frac{y_j - y_i}{x_j - x_i} x_i$$

Example



slope

$$\frac{7-1}{6-1} = \frac{6}{5}$$

Intercept

$$1 - \frac{6}{5}1 = -\frac{1}{5}$$

$$y_{ij}(x) = -\frac{1}{5} + \frac{6}{5}x$$

$$c_{13} = |6 - y_{ij}(3)| = |6 - 3\frac{2}{5}|$$

$$= 2\frac{3}{5}$$