$$\sigma = \sqrt{MS_{error}}$$

$$MS_{error} = \frac{SS_{error}}{\nu_{error}}$$

$$SS_{error} = SS_{TOTAL} - SS_{MODEL}$$

$(n-1)\,VAR(y)$?

$$SS_{model} = r^2_{reduced} \cdot SS_{TOTAL}$$

$$\boxed{\sigma = 6.07}$$

?????

$\sigma_{webassign} = 6.05$

Q5.

10

$1+4+9+16 = 3$

$n = 17$

$$\sum_{i=1}^{n} x_i = 1448.6$$

$$\sum_{i=1}^{n} y_i = 10.57$$

$$\sum_{i=1}^{n} x_i^2 = 147414.45$$

$$\sum_{i=1}^{n} x_i y_i = 987.536$$

$$\sum_{i=1}^{n} y_i^2 = 7.8653$$

$$\chi^2 = \sum_{i=1}^{n} \left(y_{fit} - y_i\right)^2$$

"goodness of fit"

Linear regression:

$$y_{fit} = b_0 + b_1 x$$

$$\chi^2 = \sum_{i=1}^{n} \left(\underline{b_0} + \underline{b_1 x_i} - y_i\right)^2$$

$$\frac{\partial \chi^2}{\partial b_0} = 0 \qquad\qquad x^2 \downarrow 2x$$

$$\frac{\partial \chi^1}{\partial b_1} = 0$$

$$\partial \chi^2 = \sum^{n} \cancel{2}\left(b_0 + b_1 x_i - y_i\right)(\cancel{1})$$

$$\overline{\partial b_0} \qquad i=1 \qquad = 0$$

$$\frac{\partial \chi^2}{\partial b_1} = \sum_{i=1}^{n} \cancel{2}\,(b_0 + b_1 x_i - y_i)\, x_i = 0$$

$$\boxed{\sum_{i=1}^{n} b_0} + \sum_{i=1}^{n} b_1 x_i - \sum_{i=1}^{n} y_i = 0$$

$$\sum_{i=1}^{n} b_0 x_i + \sum_{i=1}^{n} b_1 x_i^2 - \sum_{i=1}^{n} x_i y_i = 0$$

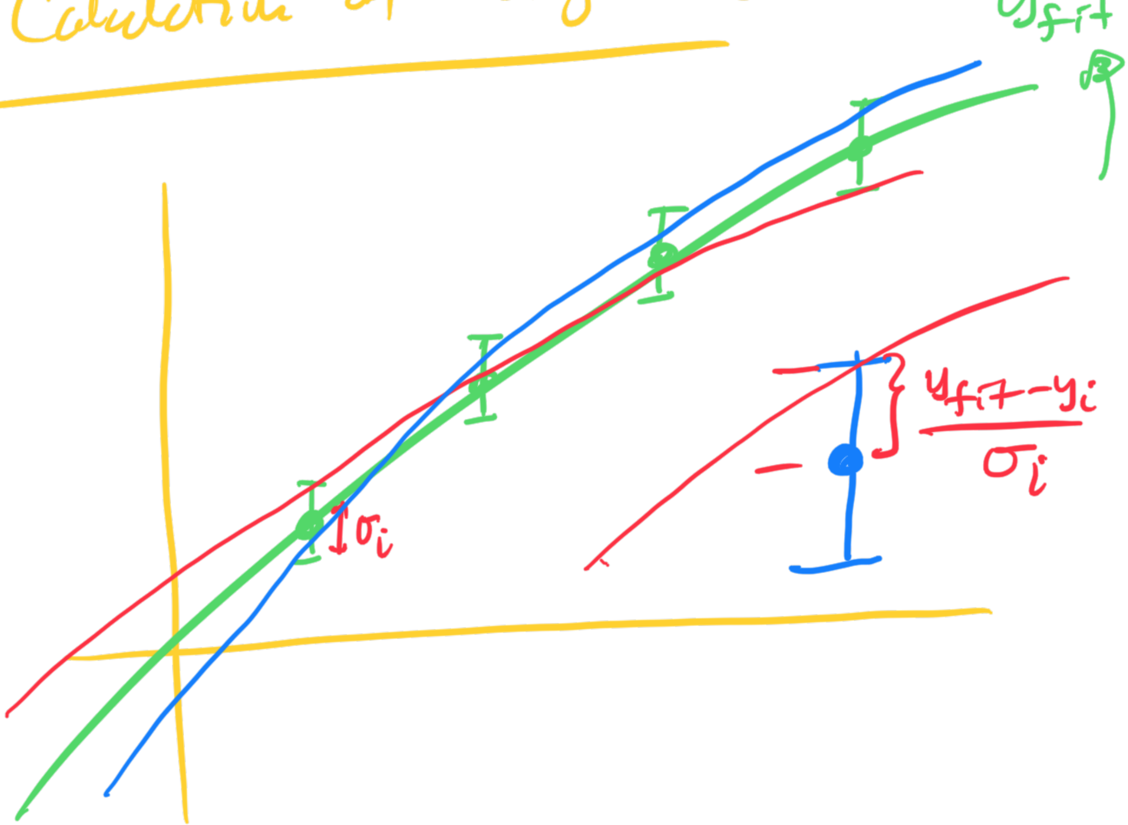
$$b_0 \boxed{n} + b_1 \boxed{\sum_{i=1}^{n} x_i} - \boxed{\sum_{i=1}^{n} y_i} = 0$$

$$b_0 \boxed{\sum_{i=1}^{n} x_i} + b_1 \boxed{\sum_{i=1}^{n} x_i^2} - \boxed{\sum_{i=1}^{n} x_i y_i} = 0$$

$b_0 =$

$b_1 =$

Calculation of Sigma (σ)



How do we chose y_{fit} when we have uncertainties on the data

$$\chi^2 = \sum_{i=1}^{n} \Bigg(\overbrace{\frac{y_{fit} - y_i}{\cancel{\sigma_i}\ \sigma}}^{\leq 1} \Bigg)^2 \leftarrow$$

$\chi^2 \leq n$

What if $\sigma_i = \sigma$ for all data pts ?

$$\chi^2 = \frac{1}{\sigma^2} \sum_{i=1}^{n} (y_{fit} - y_i$$

$$\frac{\partial \chi^2}{\partial a} = \frac{\partial \chi^2}{\partial b} = 0$$

$\boxed{\text{Reduced } \chi^2}$

$$\chi^2_{red} \equiv \frac{1}{\nu_{error}} \chi^2 \lesssim 1$$

$$\boxed{\chi^2_{red} = \frac{1}{\nu_{error}} \cdot \frac{1}{\sigma^2} \sum_{i=1}^{n} (y_f - y_i}$$

$= 1$

$$1 = \frac{1}{\nu_{error}} \cdot \frac{1}{\sigma^2} \sum_{i=1}^{n} (y_{fit} - y_i$$

$$\sum^{n} (y_{fit} - y_i)$$

$$\sigma^2 = \frac{1}{\nu_{err}} \sum_{i=1} (y_{fit} - y_i)$$

$$\boxed{\sigma = \sqrt{\frac{1}{\nu_{err}} \sum_{i=1}^{n} (y_{fit} - y_i)^2}}$$