

THURS MAR 14

# LINEAR REGRESSION

⊗ π day!

LINEAR MODEL:  $Y = mX + b$

Annotations:  
-  $m$ : slope  
-  $b$ : intercept  
-  $Y$ : output  
-  $X$ : input

COVARIANCE:  $\frac{1}{n-1} \sum (x_i - \bar{x})(y_i - \bar{y})$

CORRELATION COEFFICIENT:  $\frac{\sum (x_i - \bar{x})(y_i - \bar{y})}{\sqrt{\sum (x_i - \bar{x})^2} \sqrt{\sum (y_i - \bar{y})^2}}$

REGRESSION:  $\frac{\sum (x_i - \bar{x})(y_i - \bar{y})}{\sum (x_i - \bar{x})^2}$

Annotations:  
- numerator: estimate of  $m$   
- denominator: specific to  $X$

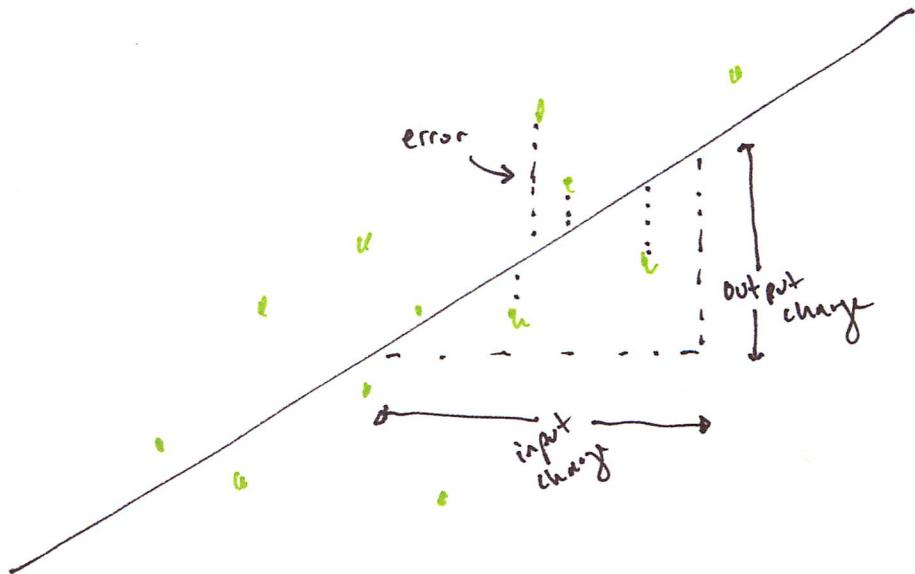
Q: CAN WE GUESS  $\pi$  BY

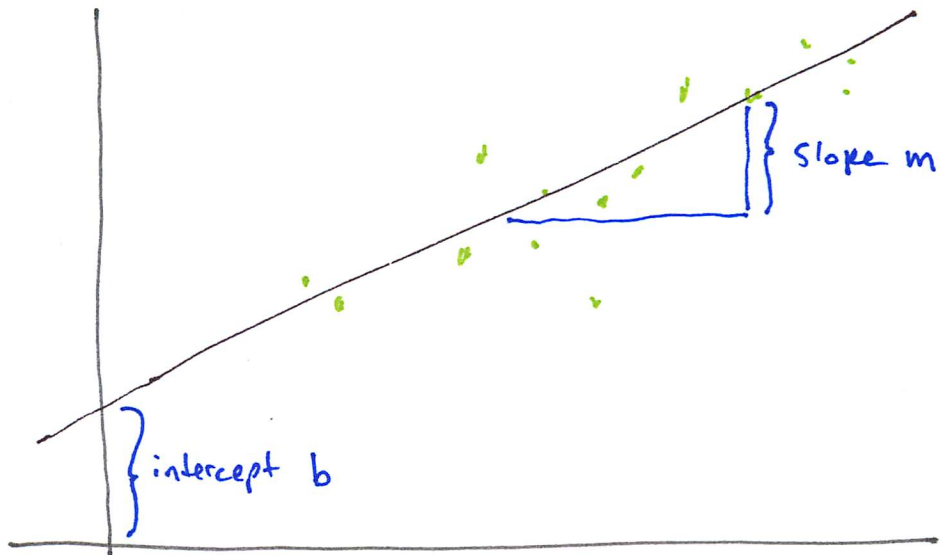
MEASURING CIRCLES?

Q: CAN WE MEASURE CORRELATION FOR NON-LINEAR DATA?

would be same if we swap  $x, y$

# LINEAR MODEL





If we have an estimate of the slope  $\hat{m}$ , how do we find an estimate of the intercept  $\hat{b}$ ?

