Recap from 230/291

$Y = f(\vec{x}) + \varepsilon$ General Modeling Framework

① Y = outcome variable that we want to explain

② $\vec{x}$ = a vector $(x_1, \ldots, x_p)$ of predictor/explanatory variables

③ $f()$ = a function that makes explicit the relationship between Y & $\vec{x}$

④ ε = error residuals

Ex: Simple linear regression

$Y = f(\vec{x}) + \varepsilon$

$Y = \beta_0 + \beta_1 x + \varepsilon$

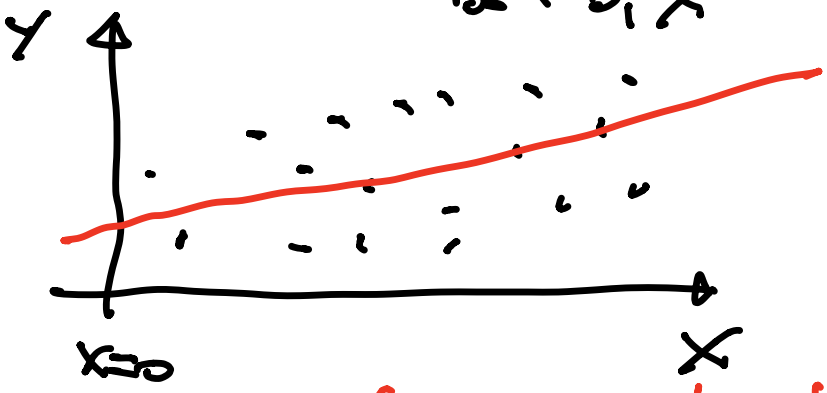
parameters

β_0 = intercept

β_1 = slope

Given data in pairs of observations (y, x) you want to estimate these parameter values such that $\hat{y} = \hat{b}_0 + \hat{b}_1 x$

$= b_0 + b_1 x$



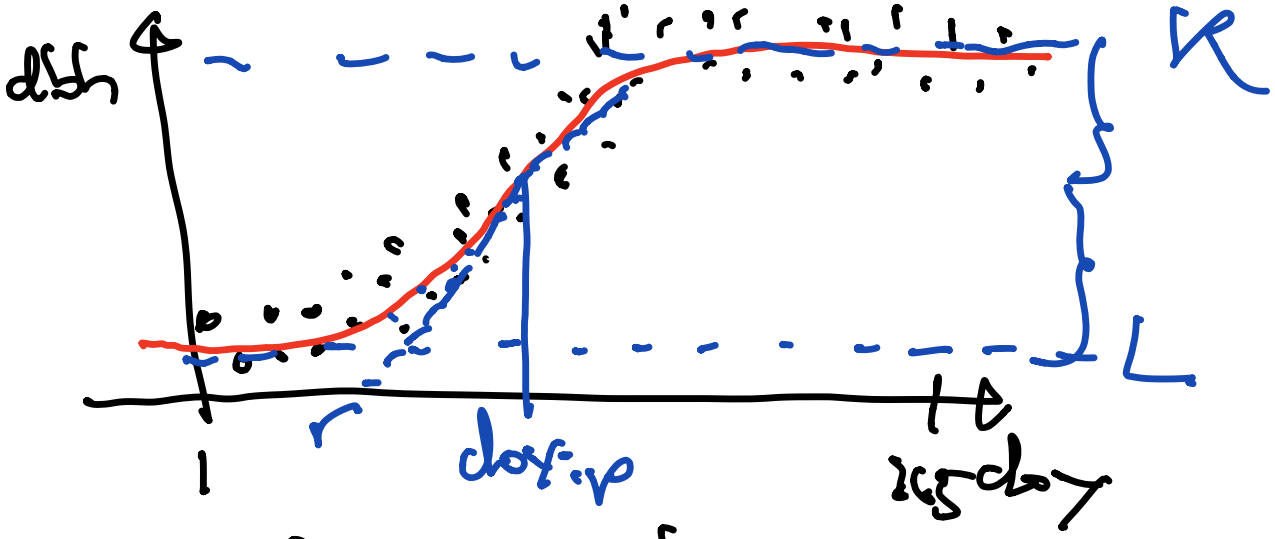
You want to find slope parameter & intercept parameter of red line.

Ex: Dendrobonds data. Say you collect n pairs of data (dbh, doy)

doy day of year
Jan 1st = 1
10 ...

Goal $dbh = f(doy) + \varepsilon$

$y = f(x) + \varepsilon$



Now the functional form $f()$ we'll use is not a line, rather the generalized logistic curve w/ 5 parameters.

$$dbh = \frac{L + (K - L)}{1 + \frac{1}{\theta}\left(e^{-r\frac{(doy - doy_{ip})}{\theta}}\right)^{\theta}}$$

> parameters

① L = lower asymptote

② K = upper "

③ doy_ip = inflection point of curve
point @ which curvature of S changes

④ r = slope of curve @ inflection point

⑤ θ = symmetry of top & bottom of curve
parameter where
θ = 1 means symmetry

We want to estimate these 5 parameters with data

where

$$dbh = f(dx) + \varepsilon$$

↑ error term