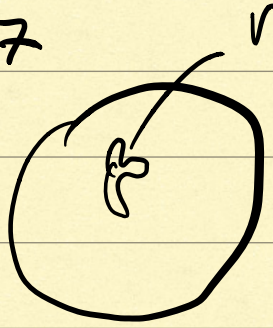
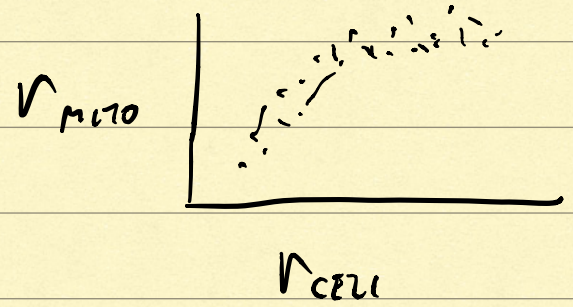
PS 7





$$r_{MITO} = a\, r_{CELL} + b + \epsilon$$

$$\star\ r_{MITO} = b\left(1 - e^{-a\, r_{CELL}}\right) + \epsilon$$

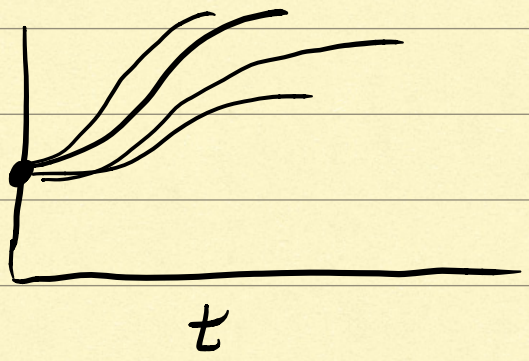
$$r_{MITO} = b\, r_{CELL}^{\alpha} + \epsilon$$

$$\log r_{MITO} = \log b + \alpha \log r_{CELL}$$

OVERVIEW

3 KINDS OF RANDOMNESS

STOCHASTIC PROCESS

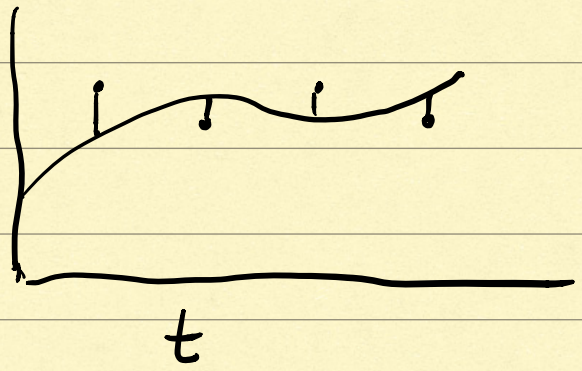


$\swarrow P_A(a)$

$$\frac{dx}{dt} = Ax$$

HETEROGENEITY

BATCH EFFECT



$$y = x + \epsilon$$

$$\epsilon \sim p_\epsilon(e)$$

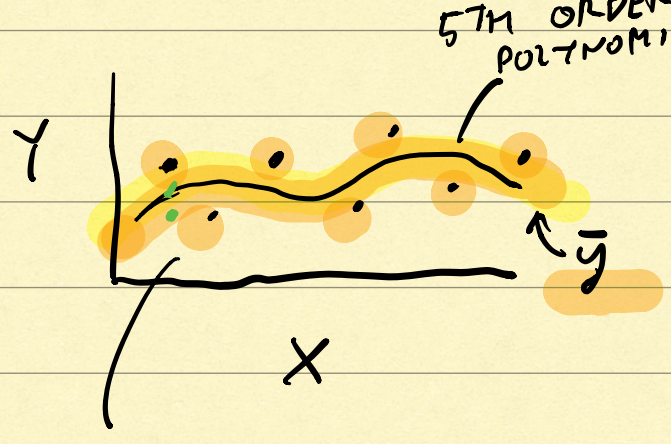
MEASUREMENT NOISE
OBSERVATION NOISE

MAXIMUM LIKELIHOOD IS DEFINED FOR ALL THESE PROBABILITY MODELS

VARIANCE - BIAS TRADEOFF & MODEL COMPLEXITY

E.X. LINEAR REGRESSION

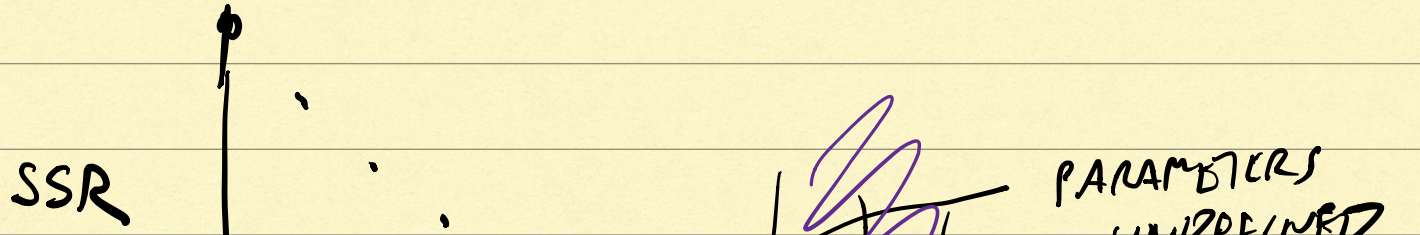
$n_{POLY} = n_{OBS} - 1$

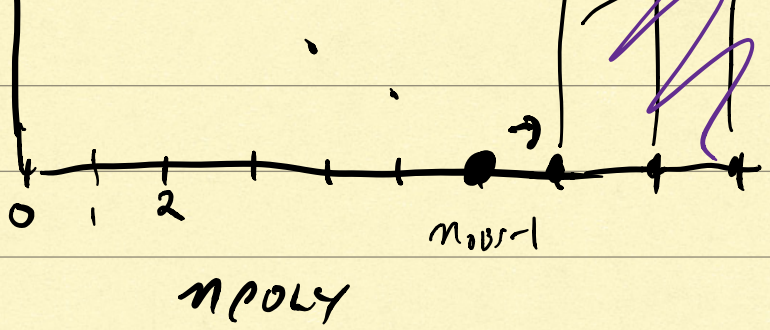


$n_{POLY} = 1$

n_{OBS} OBSERVATIONS

FIT TO $y(x) = \beta_0 + \beta_1 x + \dots \beta_{nPOLY} x^{nPOLY} + \epsilon$

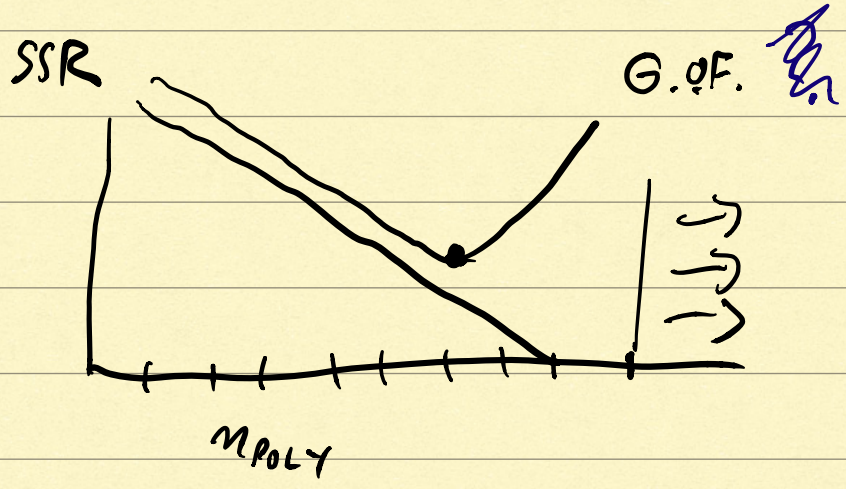


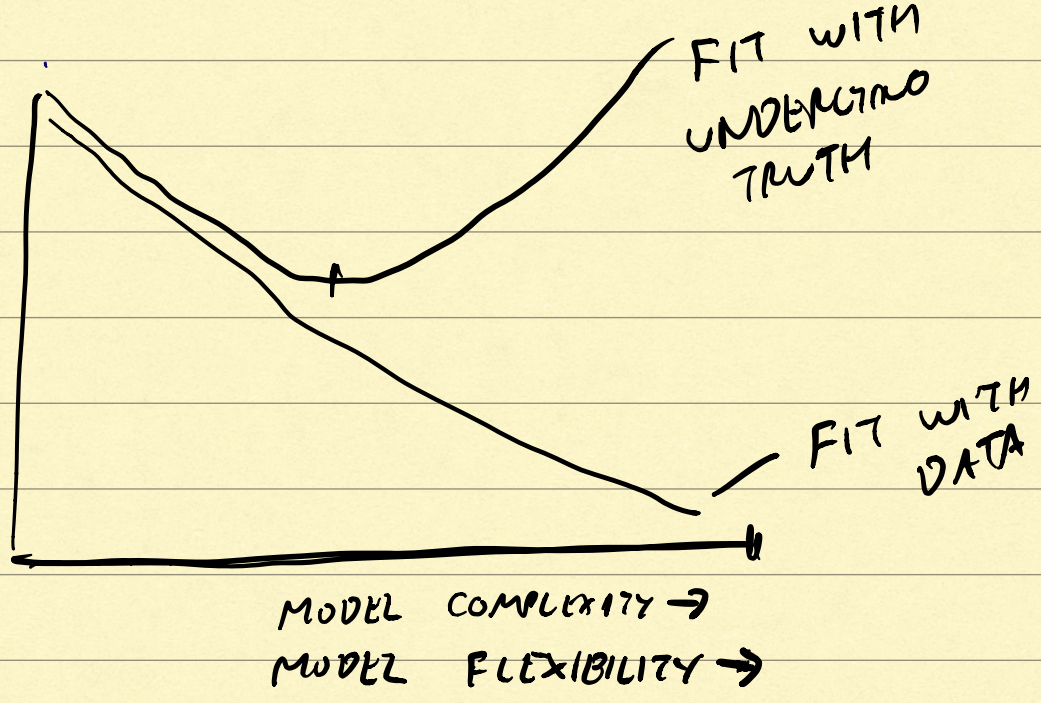


GOODNESS OF FIT

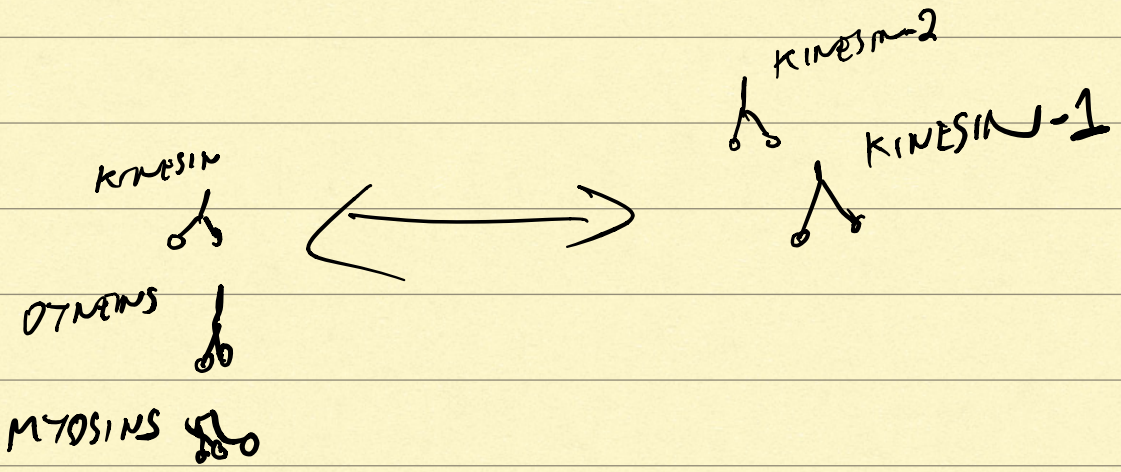
G.O.F. $\sum (\bar{y} - y(t))$

↑ "TRUTH"





HIGH BIAS ⟷ HIGH VARIANCE



IMMUNORECEPTORS ⟷ PD1 MOUSE