

Models and Likelihood

Statistical Models

- ▶ What is a statistical model?
- ▶ What are parameters?
- ▶ What is likelihood?
- ▶ What is maximum likelihood?

Maximum Likelihood Example One - Coin Flipping

- ▶ Experiment is flipping a coin.
- ▶ Data is number of heads and tails out of N flips
- ▶ Parameter p is probability of heads. What is most likely value of p given the data?

Maximum Likelihood Example Two - Temperature Measurement

- ▶ Experiment is measuring the temperature
- ▶ Model says errors have mean zero around true temperature and normal distribution.
- ▶ Parameters are the true temperature and the variance of the error.

Maximum Likelihood Example Three - Linear Regression

- ▶ Experiment yields data (x, y) .
- ▶ Model says there are m and b with $y = mx + b + e$ where e is normally distributed.
- ▶ Parameters are m , b , and the variance σ^2 .