

# Probability vs Likelihood

## Probability:

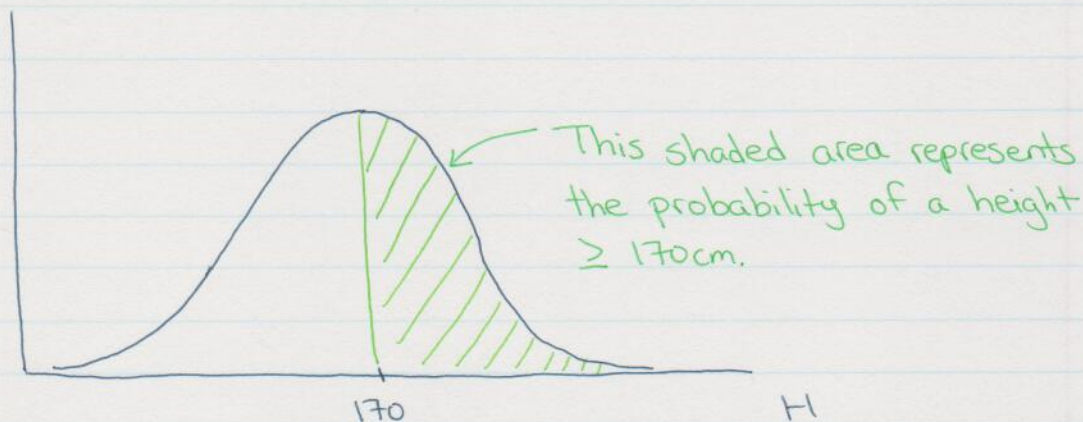
- **Probability** refers to finding the chance of something given a sample distribution of data.
- E.g. Suppose we have a dataset about the heights of people in country A, and that the mean is 170cm and the standard dev is 3.5.

If we want to find the probability of people with height <sup>equal or</sup> over 170cm, we would do

$$P(\text{height} \geq 170\text{cm} \mid \mu = 170, \sigma = 3.5)$$

↑  
Symbol for  
mean

↑  
Symbol for  
std dev



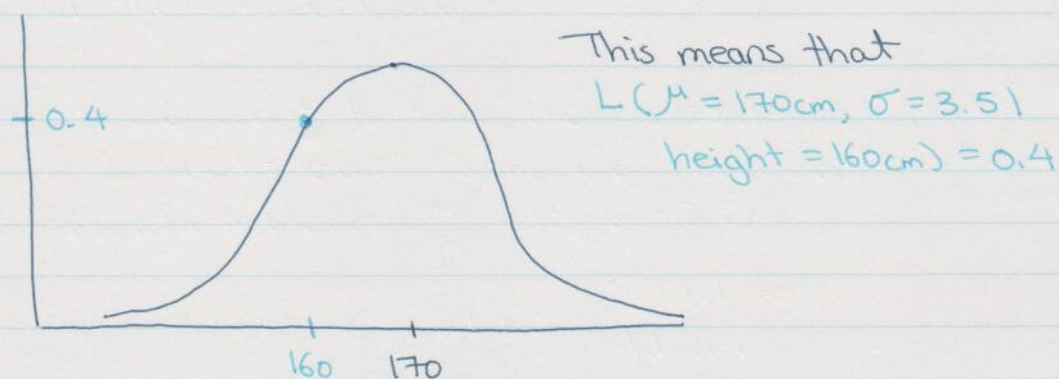
With probability, we vary the LHS and keep the RHS constant.

I.e.  $P(\theta \mid \beta)$

↑    ↑  
Vary    keep this  
this    constant

## Likelihood:

- **Likelihood** involves calculating the best distribution or best characteristics of a data given a particular feature value or situation.
- E.g. Using the prev example, we want to find the likelihood of a height being 160cm



With likelihood, we vary the dataset features (mean and std dev) in order to find the maximum likelihood.

- Likelihood means to increase the chance of a particular situation to happen by varying the characteristics of the dataset.
- I.e. Probability is used to find the chance of occurrence of a particular situation while likelihood is used to generally maximize the chances of a particular situation to occur.