from the discrete to the continuous

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0, 1, 2… 10

binomial probability

the chance of getting k heads in n tosses

when the probability of heads is p

$$\mathrm{P}[X = k] = \binom{n}{k} p^k (1-p)^{n-k}$$

↓

probability mass function

probability mass function

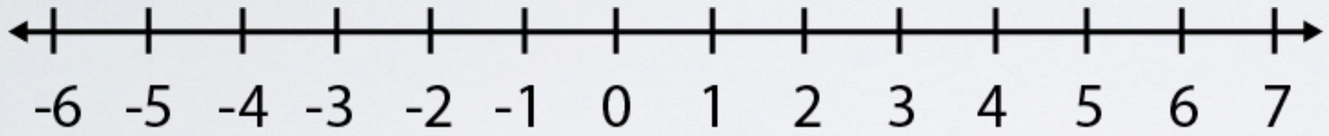
$$\mathrm{P}[X = k] = \binom{n}{k} p^k (1-p)^{n-k}$$

normal distribution

= Gaussian distribution
= bell-shaped curve

random variables

discrete random variables can only take values at separated points



continuous random variables can take any value within an interval

continuous random variable

discrete random variable

↓

probability **m**ass **f**unction

pmf

P [height = 6.000000000000000000000000000000000000000000

continuous random variable

discrete random variable

↓

probability **m**ass **f**unction

pmf

~~**P** [height = 6.000000000000000000000000000000000000000000000000~~

discrete random variable

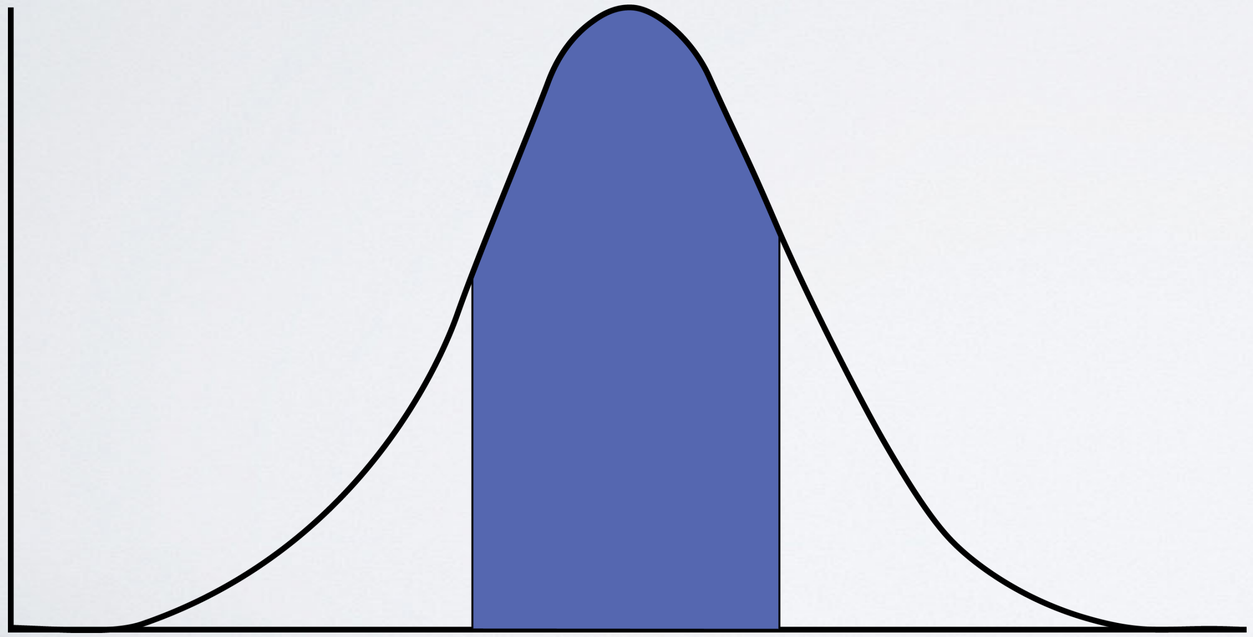
probability mass function

P [height = (5’1 1”: 6’1”)]

continuous random variable

↓

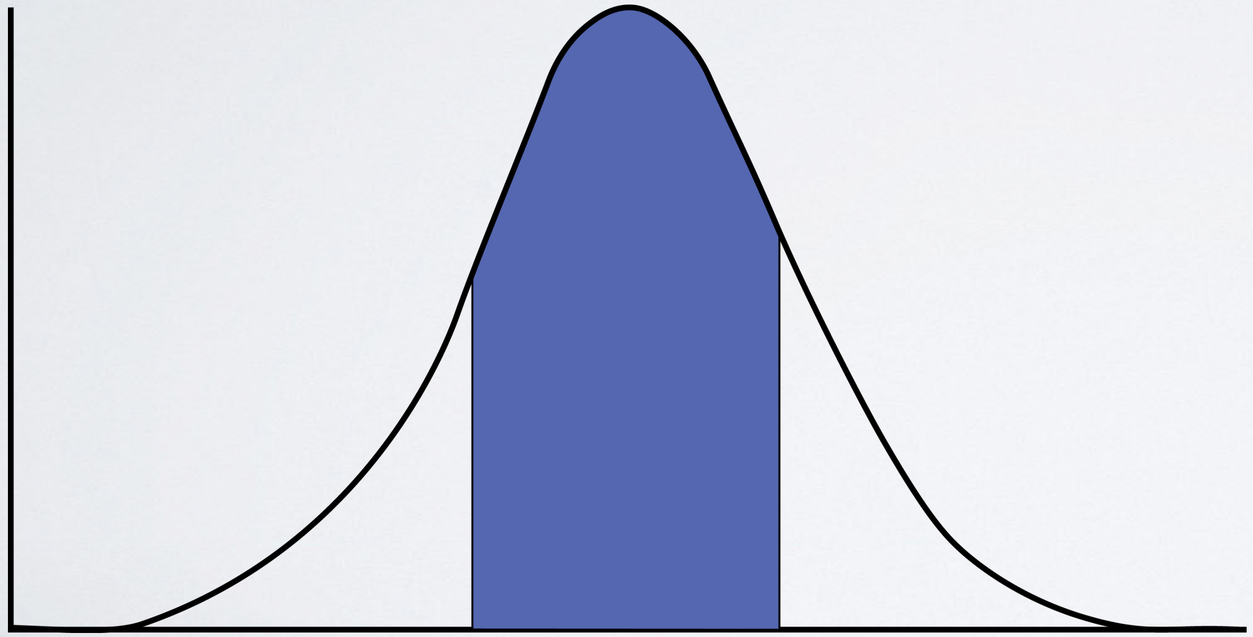
probability **d**ensity **f**unction



continuous random variable

↓

pdf



the pdf for a random variable X from a normal distribution with mean μ and standard deviation σ

$$f(x) = \frac{1}{\sqrt{2\pi}} \frac{1}{\sigma} e^{\left[-\frac{1}{2\sigma^2}(x-\mu)^2\right]}$$

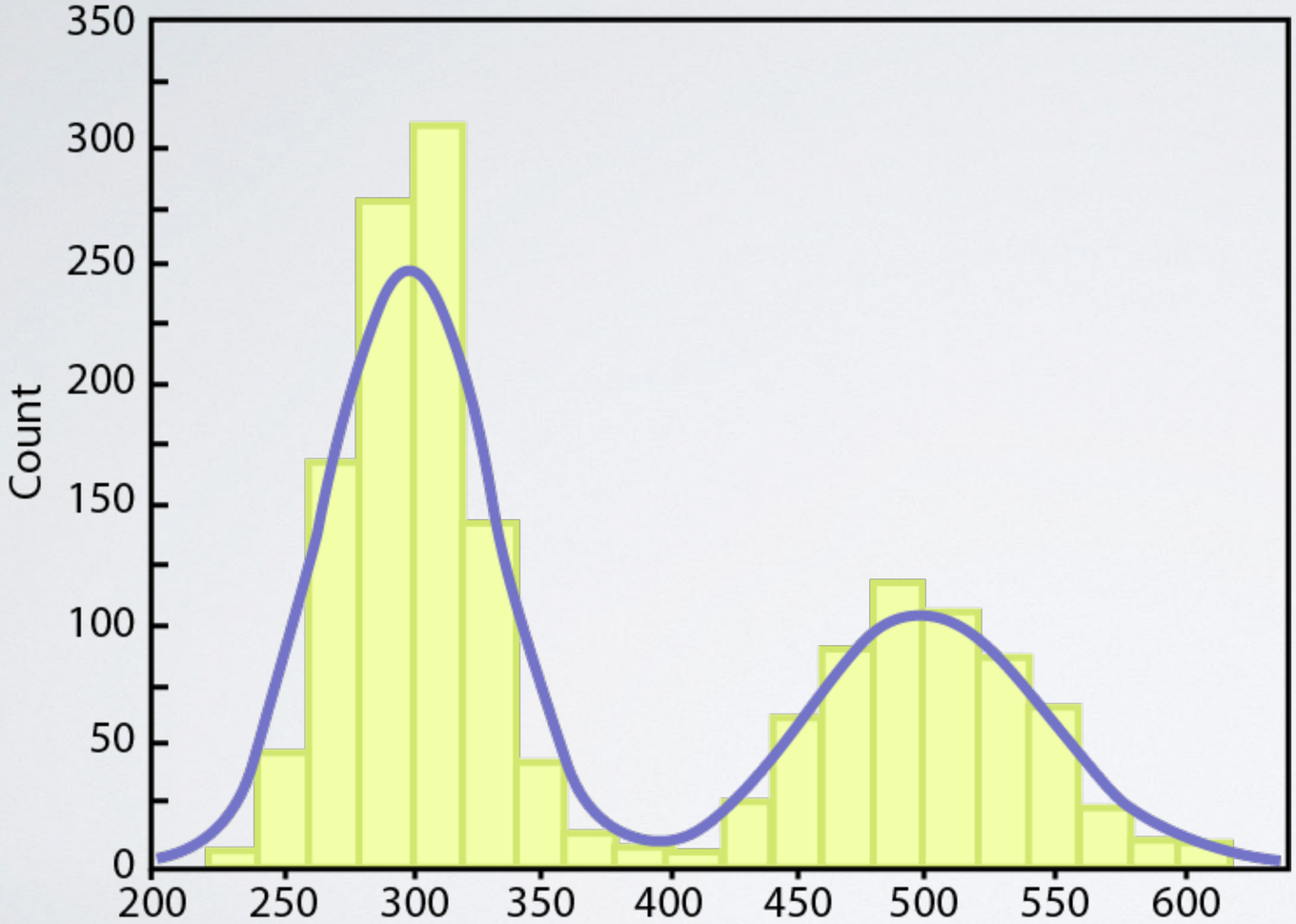
probability **m**ass **f**unction

assigns the probability that a random variable takes a specific value for the discrete set of possible values. the sum of those probabilities over all possible values must equal one

probability **d**ensity **f**unction

any function of x that is non-negative and which has area one underneath its curve

probability density function



important distributions

- continuous
  - normal
  - uniform
  - beta
  - gamma
- discrete
  - binomial
  - Poisson

summary

1. continuous random variables can take **any value in a range**
2. the probability that a continuous random variable takes a specific value is **zero**
3. its probabilities are determined by a **pdf**, which is non-negative and the area under the curve is equal to one
4. the probability that it lies between c and d is the **area under the pdf** between c and d