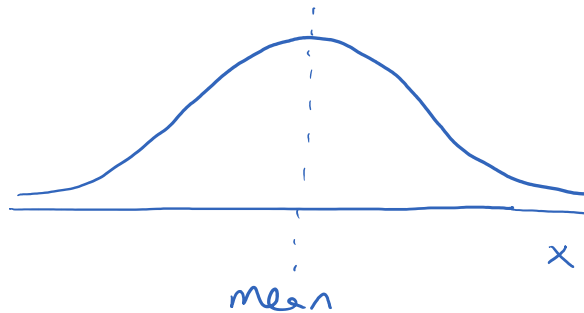


Section 5.2: The Normal Distribution

Thursday, April 2, 2020 3:42 PM

we've looked at bell-shaped curves quite a lot:

normal
distribution

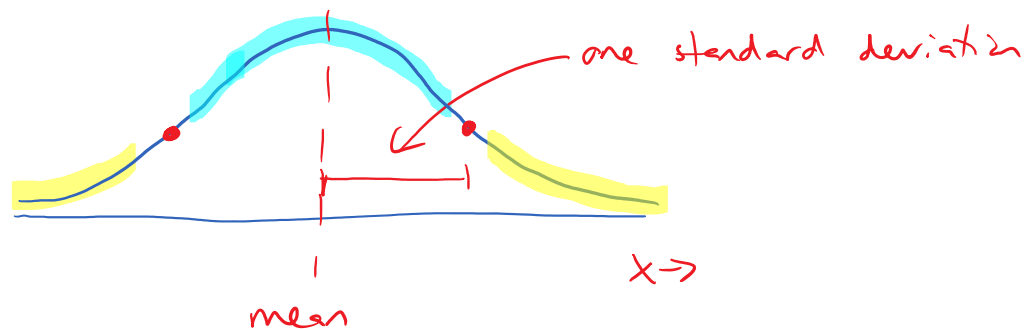


unimodal

symmetrical

we'll see later why this shape is so common, but for now we'll say that you can see this distribution whenever your continuous random variable is the result of many chance outcomes

note: you can estimate the standard deviation from the graph of the normal distribution:



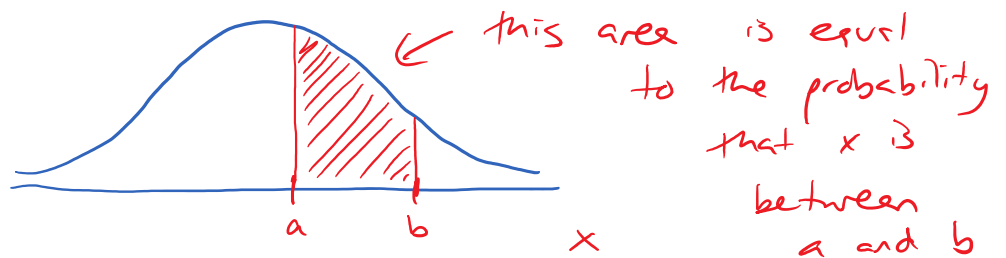
look for the two points on the curve where the curvature goes from "concave up" \cup to "concave down" \cap

digression: will not be tested

what is the shape? it's given by the formula

$$y = \frac{1}{\sigma\sqrt{2\pi}} e^{-\frac{(x-\mu)^2}{2\sigma^2}} \quad \text{for } -\infty < x < \infty$$

the probability of the data point x being between values a and b is equal to the area under the curve between points a and b :



but how do you calculate this area?

- ① use a calculator or computer (PREFERRED!)
- ② look it up in a table of values

for this course, we will use an online calculator rather than using a table of values

if using a table, there's a problem! you'd need
an infinite number of tables

- one for every combination of μ (mean)
and σ (standard deviation)

solution! standardize it

instead of using μ and σ , you
use

$$z = \frac{x - \mu}{\sigma}$$

the z-score that we looked at
in section 2.4.