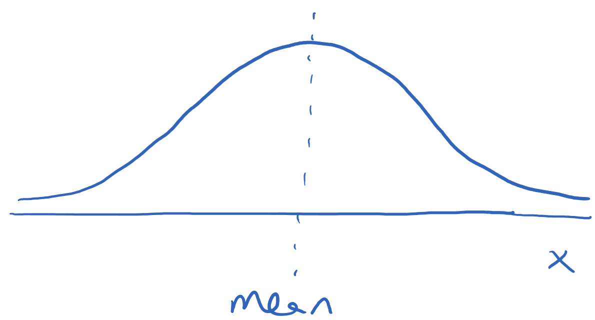
Section 9.2: The Normal Distribution

Thursday, April 2, 2020 3:42 PM

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

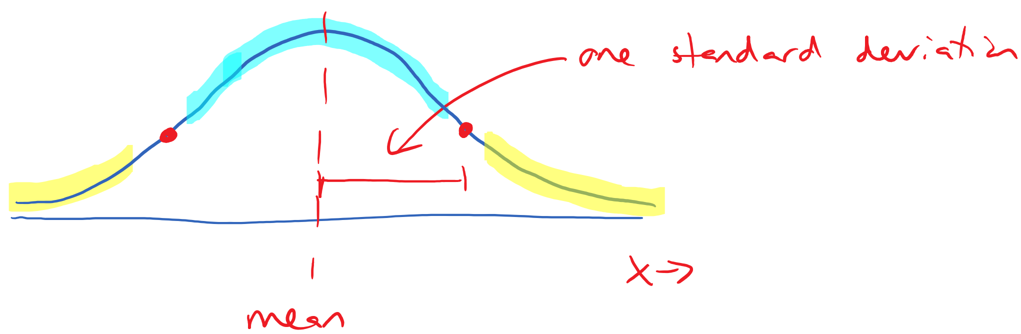
normal distribution



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" ◡ to "concave down" ∩

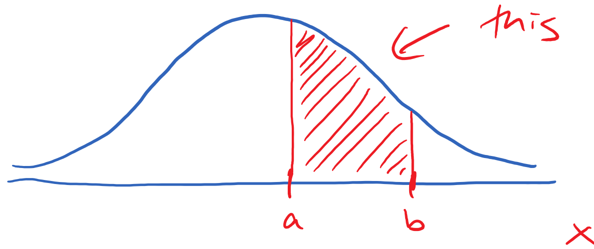
digression : will not be tested

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:



this area is equal to the probability that x is between 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.