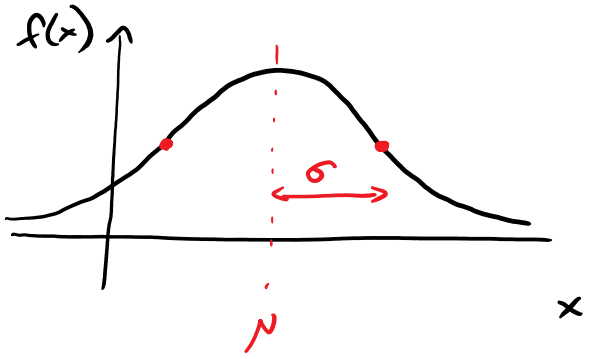
Section 6: The Normal Distribution

Wednesday, March 29, 2017 1:49 PM

- mound-shaped distributions occur very frequently



mean μ
std dev σ

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

to find the probability that x lies between points a and b, need to find the area under the curve between a and b

- integrate from a to b, but standard integration techniques fail!

⇒ have to use numerical methods (trapezoidal, Simpson's)

or ⇒ look it up in a table of values

problem! you'd need an infinite number of tables, one for each combination of μ and σ

solution! standardize it

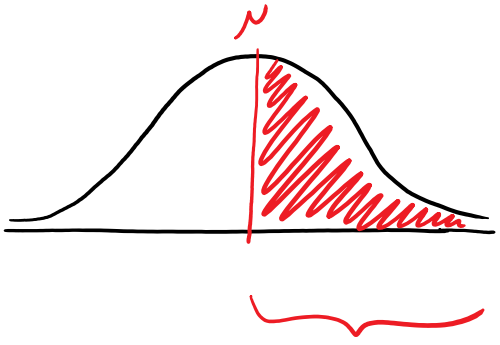
standard normal distribution:

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

Z = number of standard deviations from the mean that the point of interest x is

(note: if Z is negative, x is below the mean)

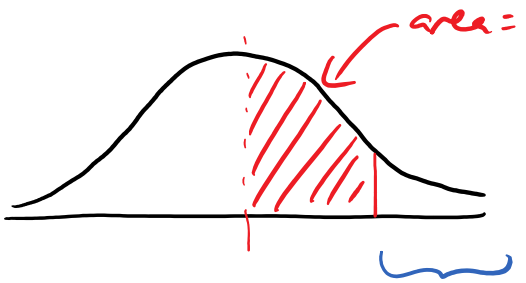
properties:



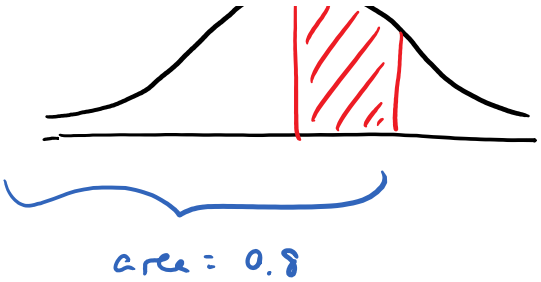
total area under curve: 1

symmetrical

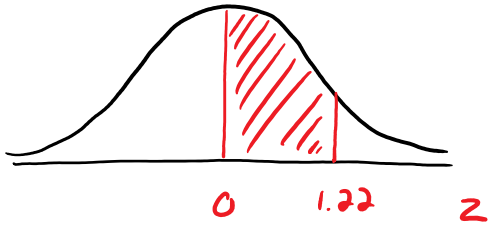
0.5



area? 0.2



example of using the normal table:



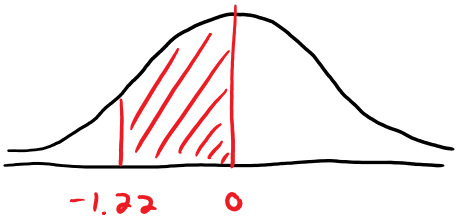
What is the probability of having a z-score between 0 and 1.22?

z	0.02
1.2	0.3888

$P(0 < z < 1.22) = 0.3888$

or 39%

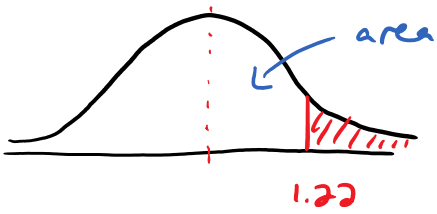
what, then, is $P(-1.22 < z < 0)$?



symmetrical

$P = 39\%$

what, then, is $P(z > 1.22)$?



$P(z > 1.22) = 0.5 - 0.3888$

$= 0.1112$

$= 11\%$