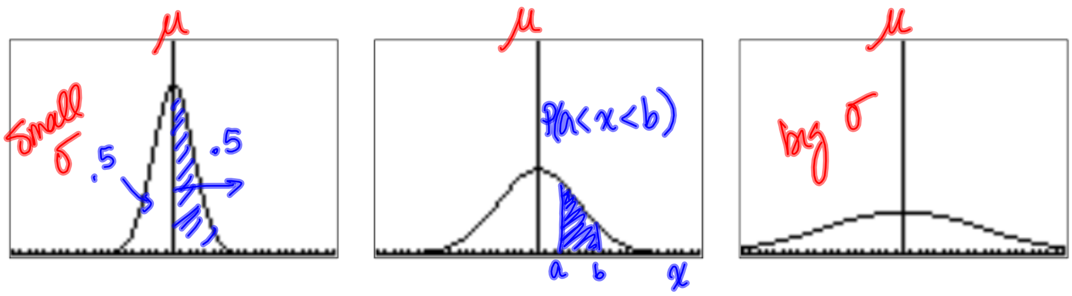
WEEK 14A REVIEW (8.5 and 8.6)

Many natural and social phenomena produce a continuous distribution with a bell-shaped curve.



Every bell-shaped (NORMAL) curve has the following properties:

- Its peak occurs directly above the mean, μ
- The curve is symmetric about a vertical line through μThe curve never touches the x-axis. It extends indefinitely in both directions.
- The area between the curve and the x-axis is always 1 (total probability is 1).

The probability that a data value will fall between $x = a$ and $x = b$ is given by the area under the curve between $x = a$ and $x = b$.

★ ★

The standard $\boxed{\text{normal}}$ curve has $\mu = 0$ and $\sigma = 1$ and uses Z

Calculator commands are

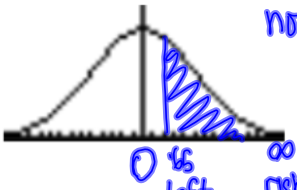
- normalcdf(a, b, μ, σ) to get $P(a \le x \le b)$ $= P(a < x < b)$
- invNorm(p, μ, σ) to get the c value for $p = P(x \le c)$

area to the left

Example: Given that Z is the standard normal variable, find

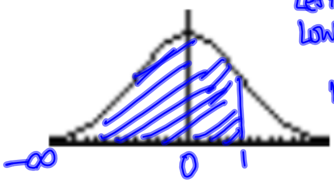
99
1000... 0

(a) $P(Z > 0.65)$



normalcdf(.65, 1E99, 0, 1)
= 0.2578

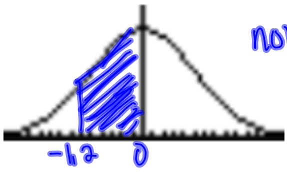
(b) $P(Z<1)$



normalcdf(-1E99, 1)
=.8413

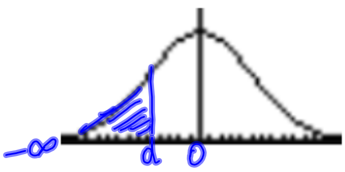
asked for Prob

(c) $P(-1.2 < Z < 0)$



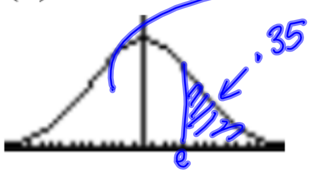
normalcdf(-1.2, 0) = .3849
= normalcdf(-1.2, 0, 0, 1)

(d) ~~a~~ the value of d such that $P\left(Z \le d\right) = 0.25$



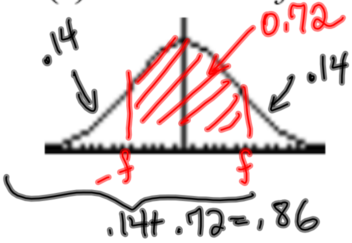
invNorm(0.25) = invNorm(.25, 0, 1)
= -.6745

(e) ~~a~~ the value of e such that $P\left(Z \ge e\right) = 0.35$



1-.35 = .65
invNorm(.65) = 0.3853

(f) ~~a~~ the value of f such that $P\left(-f \le Z \le f\right) = 0.72$



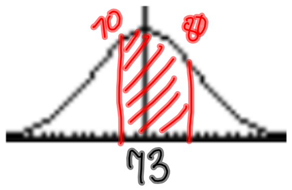
1-.72 = .28

f = invNorm(.86) = 1.0803
-f = invNorm(.14) = -1.0803

Example: Suppose that the course scores are normally distributed with a mean of 73 and a standard deviation of 12.

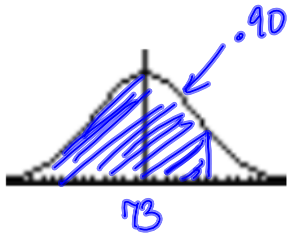
(a) What is the probability that a student earns a C by scoring between 70 and 80?

normalcdf(70, 80, 73, 12) = 0.3189

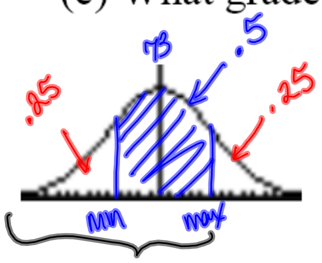


(b) What is the minimum exam grade required for a student to score in the 90th percentile?

invNorm(.9, 73, 12) = 88.3786



(c) What grades bracket the middle 50% of the students?



min = invNorm(.25, 73, 12) = 64.91

max = invNorm(.75, 73, 12) = 81.09