RECITATION
STATISTICAL INFERENCE

INFERENCES ABOUT μ
CONFIDENCE INTERVAL ESTIMATION USING Z
ONE-SAMPLE Z TESTS
ONE-TAILED AND TWO-TAILED TESTS

First:
Collect homework due today.
Handout homework solutions.
Review one or more homework problems, as needed.

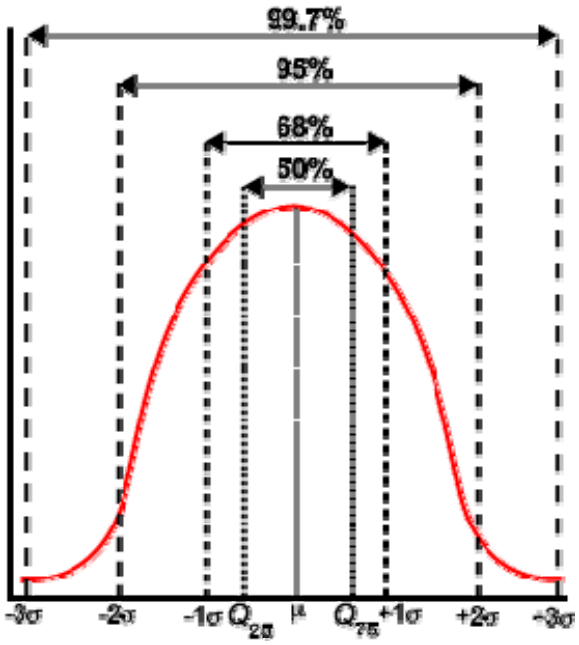
Then:
Explain difficult concepts from the lecture and do problems in this set of notes.

Confidence Intervals (CI)

Statistics means never having to say you're certain.

In a normal distribution:

- 68% of samples fall between ±1 SD
- 95% of samples fall between ±2 SD (actually + 1.96 SD)
- 99.7% of samples fall between ±3 SD



There is less than a 1 in 20 chance of any sample falling outside ±2 SD (95% CI, *P* = 0.05) and less than a 1 in 100 chance of any sample falling outside ±3 SD (99% CI, *P* = 0.01).

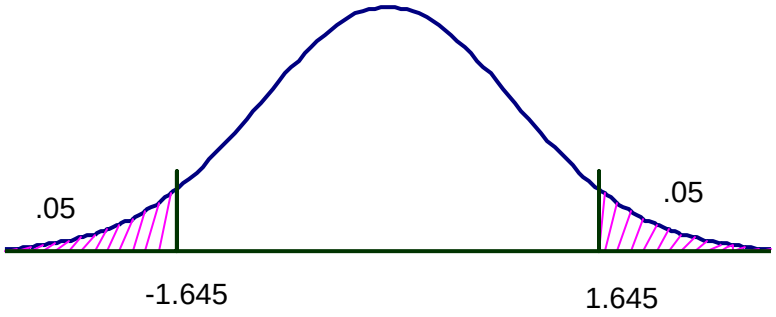
Source: http://www-micro.msb.le.ac.uk/1010/1011-18.html

EXAMPLE:
A toothpick manufacturer wants every box to contain exactly (on average) 500 toothpicks. Suppose you took a random sample of n = 81 boxes, and found:

$\bar{X}$ =498 toothpicks
S = 9 toothpicks

a) Test at $\alpha = .10$
b) Construct a 90% CIE of μ

H_0: $\mu = 500$
H_1: $\mu \neq 500$



$$Z = \frac{498 - 500}{\frac{9}{\sqrt{81}}} = \frac{-2}{1} = -2$$

REJECT H_0

Therefore, we reject H_0 at $p < .1$

As a 90%, Confidence Interval:

$$498 \pm 1.645\left[\frac{9}{\sqrt{81}}\right] = 498 \pm 1.645(1)$$

$496.36 \longleftrightarrow 499.65$ toothpicks per box

[REJECT H_0 : 500 is NOT in the interval]

EXAMPLE:
The FTC wishes to determine whether 9 oz candy bars really are 9 oz. They take a sample of 49 candy bars:

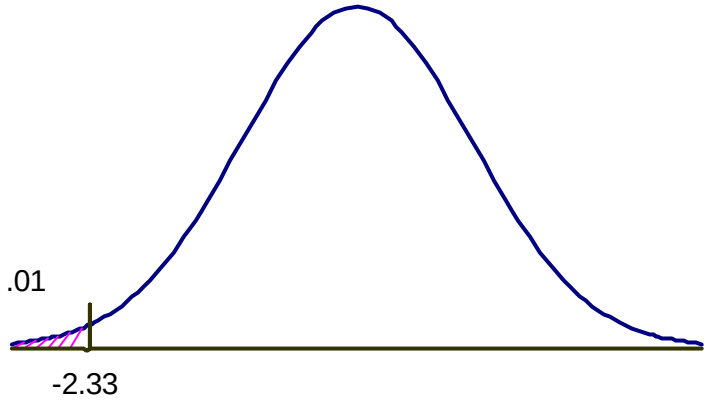
$\overline{X}$ = 8.94 oz

S = .12 oz

Test at α = .01 level

H_0: $\mu \geq 9$ oz

H_1: $\mu < 9$ oz



$$Z = \frac{8.94 - 9.00}{.12 / \sqrt{49}} = \frac{-.060}{.017} = -3.5$$

REJECT H_0

Therefore, reject H_0 at $p < .05$