Section 7.2: Large-Sample Hypothesis Test - Population Means

Thursday, March 8, 2018 12:34 PM

handout - question #1:

H_0: null hypothesis $\quad \mu = 60$ (always equality) (not slackers)

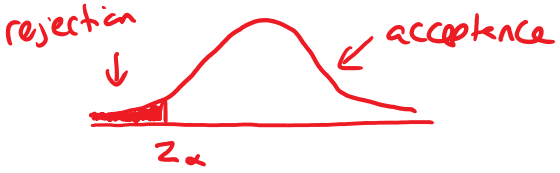
H_a alternate hypothesis $\quad \mu < 60$ (always inequality) (slackers!)

test statistic:

$$z = \frac{\bar{x} - \mu_0}{\sigma/\sqrt{n}} = \frac{57.5 - 60}{8/\sqrt{50}}$$

$$= -2.20971$$

examine rejection region:



for 99%, $z_\alpha = -2.326$ ← z in acceptance

95%, $z_\alpha = -1.645$ ← z is in rejection region

conclusion: NOT OPTIONAL!

MUST ANSWER ORIGINAL QUESTION!

At the 99% level, we cannot conclude that they are slackers.

At the 95% level, we do think that MDA engineers are slackers.

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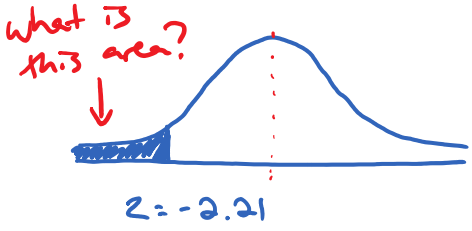
calculating p-values (another approach to the same question)

→ sometimes you don't want to just give a yes/no answer but instead to guide your reader using probabilities

take test statistic (for the preceding question, $z = -2.21$)



$P(z < -2.21) = 0.0136$
from normal table

this is the probability that the difference between $\bar{x}$ and μ_0 happened due to random chance

STATISTICALLY SIGNIFICANT:

highly significant $p < 0.01$

significant $0.01 < p < 0.05$

trending towards significance $0.05 < p < 0.1$

not statistically significant $p > 0.1$

So, using this approach for our previous example, we'd say:

"MDA engineers work significantly fewer hours ($p = 0.036$) than the industry standard"