pg. 698 8, 9, 12, 13, 16

11.1 Significance Tests (Day 2)

Conditions for Significance Tests - SIN

S - SRS I - $N > 10n$

N: means - population is $\sim N$ or $n \geq 30$

proportions - $np \geq 10$ $n(1-p) \geq 10$

(Discuss Ex. 11.4)

(z) test statistic $\dfrac{\text{estimate} - \text{hypothesized value}}{\text{standard deviation of the estimate}}$

$z = \dfrac{x - \mu}{\sigma}$

Example 11.5 (Data 11.2) $H_0: \mu = 6.7$ $\bar{x} = 6.48$ $\sigma = 2$

$$z = \frac{\bar{x} - \mu_0}{\sigma/\sqrt{n}} = \frac{6.48 - 6.7}{2/\sqrt{400}} = -2.20$$

p-value = .0139

(area under the curve)

More than 2 standard deviations below the mean. Good evidence the mean response is less than 6.7

- What constitutes good evidence? p-value

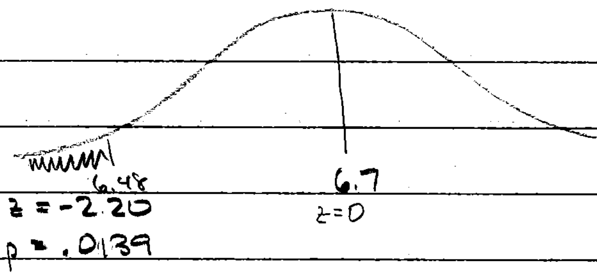
P-Value Smaller p-value means stronger evidence against H_0.

Small p-value are evidence against H_0 bc the observed value is unlikely to occur when H_0 is true. Large p-values fail to give evidence against H_0

* One-sided tests - verify direction of the z-score; i.e. $H_0: \mu < 6.7$ z score must be negative for evidence against H_0

Example 11.6 $z = -2.20 \rightarrow$ p-value $= .0139$

There is a 1.4% chance the city manager would obtain a sample of 400 calls with a mean response time of 6.48 minutes or less. The small p-value provides strong evidence against $H_0: \mu = 6.7$ and in favor of $H_a: \mu < 6.7$ min.



Example 11.7 Two-sided test (Example 11.3 pg. 692)

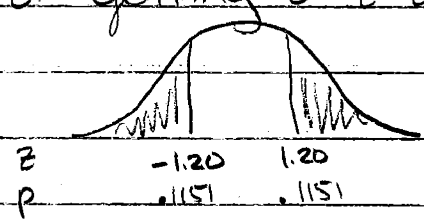
$H_0: \mu = 0$ There is no difference in job satisfaction

$H_a: \mu \neq 0$ There is a difference in job satisfaction

$\sigma = 60$ Data from 18 workers yields $\bar{x} = 17$. Workers preferred a self-paced environment. Is there enough evidence to reject the H_0?

$$z = \frac{\bar{x} - \mu}{\sigma/\sqrt{n}} = \frac{17 - 0}{60/\sqrt{18}} = 1.20$$

Two-sided test means p-value is the probability of getting a z at least as far in either direction



Values as far as $\bar{x} = 17$ would occur $2(.1151) = .2302 \approx 23\%$ of the time. This is not good evidence to reject H_0.

11.1 cont'd (Day 2)

Significance level (α) - If the p-value is as small or smaller than alpha, we say that the data "are statistically significant at level α"

$\alpha = .05$ most commonly used level ($1/20$)

1.e If $P = .03$, it is significant at the $\alpha = .05$ level (reject H_0) but not at the $\alpha = .01$ level (accept H_0)

Example 11.9 (Ex. 11.6)

P-value for $\bar{x} = 6.48 = .0139$

At the $\alpha = .05$ significance level we would reject $H_0: \mu = 6.7$ since $.0139 < .05$. It appears the response time to all life-threatening calls this year is less than last year's average of 6.7 minutes.

* Significance level should be stated prior to producing data