Stat 330
Homework 11

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1)

(a) $4.2 \pm 1.645 * \frac{\sqrt{49}}{\sqrt{30}} = 4.2 \pm 2.1$

(b) $4.2 \pm 1.96 * \frac{\sqrt{49}}{\sqrt{30}} = 4.2 \pm 2.5$

(c) When confidence level is increased, confidence interval increases as well.

(d) $4.2 \pm 1.645 * \frac{\sqrt{49}}{\sqrt{100}} = 4.2 \pm 1.15$

(e) Confidence interval decreases when sample size is increased.

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2)

(a) $\frac{43}{144} \pm 1.96 * \frac{\frac{43}{144}(1-\frac{43}{144})}{144} = 0.2986 \pm 0.0029$

(b) We are 95% confident that the true proportion of children that prefer windows is between 0.2957 and 0.3015.

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3)

(a) $37.7 \pm 1.645 * \frac{9.2}{\sqrt{100}} = 37.7 \pm 1.5134$

(b) $H_0 : \mu = 35, H_A : \mu \neq 35$

$Z = \frac{\bar{x}-35}{s/\sqrt{n}} = \frac{37.7-35}{9.2/\sqrt{100}} = 2.935$

P value from table = .0019, small enough to accept the alternative hypothesis. There is evidence that the true mean is greater than 35.

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4)

(a) $n_1 = 250, p_1 = \frac{10}{250} = 0.04, \qquad n_2 = 300, p_2 = \frac{18}{300} = 0.06, \qquad 98\% \Rightarrow 2.326$

$$(.04 - .06) \pm 2.326\sqrt{\frac{.04(1-.04)}{250} + \frac{.06(1-.06)}{300}} = 0.02 \pm 0.043$$

(b) Based on the confidence interval, there is not a significant difference.

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5)

(a) $n_1 = 14, \bar{x_1} = 50, s = 7.62, \qquad n_2 = 20, \bar{x_2} = 40.2, s = 7.96, \qquad 95\% \Rightarrow 1.96$

$$(50 - 40.2) \pm 1.96^*\sqrt{\frac{7.62^2}{14} + \frac{7.96^2}{20}} = 9.8 \pm 5.3$$

(b) $H_0 : x_1 = x_2, H_A : x_1 > x_2$

$$\text{Z} = \frac{x_1 - x_2 - 0}{\sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}}} = \frac{50 - 40.2 - 0}{\sqrt{\frac{7.62^2}{14} + \frac{7.96^2}{20}}} = 4.7$$

From the Z table, P(Z > 4.7) = 1-1 = 0, which is very small. Thus, we have significant evidence against H_0 and reject it in favor of the alternative hypothesis.