HW8

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1 $n = 21$ $\bar{x} = 1.38$ $s = 1.633$

a) t distribution should be used since we only know the sample standard deviation (s).

b) $H_0: \mu_0 = 0$ $H_a: \mu_0 \neq 0$

$$t = \frac{\bar{x} - \mu_0}{s/\sqrt{n}} = \frac{1.38}{1.633/\sqrt{21}} = 3.8726$$

$df = 21 - 1 = 20$ $\alpha = 0.01$ $t^* = 2.845 < 3.8726$

Hence we reject the null hypothesis and conclude that there is strong evidence to suggest the true mean is different from 0.

c) $df = 20$ $\alpha = 0.01$

$t = 2.845$

CI: $(1.38 \pm 2.845 \times \frac{1.633}{\sqrt{21}}) = (-0.3662, 2.3938)$

We are 99% confident that the true population mean PDSI is between 0.3662 and 2.3938

d) Since 0 is not in the 99% interval (0.3662, 2.3938), we have strong evidence to reject $\mu_0 = 0$ at $\alpha = 0.01$

2. a) Z distribution should be used since we know σ

b) $H_0: \mu_0 = 185$ $H_a: \mu_0 \neq 185$

$$z = \frac{\bar{x} - \mu}{\sigma/\sqrt{n}} = \frac{186.3 - 185}{2.7/\sqrt{32}} = 2.72367 > 1.96$$

We reject the null hypothesis and conclude that there is strong evidence to support the mean is different from 185

c) CI: $(186.3 \pm 1.96 \times \frac{2.7}{\sqrt{32}}) = (185.3645, 187.2355)$

We are 99% confident that the true mean weight is between 185.3645 and 187.2355 pounds.

d) The confidence interval in (c) does not contain the null hypothesis $\mu = 185$, hence we should reject the null hypothesis at $\alpha = 0.05$

e) I think the true mean weight is different from 185 because the true mean may not differ a lot from 190.

3. a) $H_0: \mu = 344$ $\quad H_a: \mu < 344$

b) $P(Z < -2.326) = P\left(\frac{\bar{x}-\mu_0}{\sigma/\sqrt{n}} < -2.326\right)$

$= P(\bar{x} < 330.813) = 0.01$

$\beta(315) = P(\bar{x} > 330.813) = P(Z > 2.789) =$

$1 - 0.9974 = 0.0026$

c) $\beta(310) = P\left(\frac{\bar{x}-310}{30/\sqrt{28}} > \frac{330.813-310}{30/\sqrt{28}}\right) = P(Z > 3.671) = 0.0001$