Homework for Module 7

Steve Mazza

August 29, 2011

8.2.3

a) Using $n = 13$, $\bar{x} = 2.879$, $\sigma = 0.325$, and $\mu = 3.0$ and applying the 2-sided z-test from page 369,

$$\begin{aligned} z &= \frac{\sqrt{n}(\bar{x} - \mu_0)}{\sigma} \\ &= \frac{\sqrt{13}(2.879 - 3.0)}{0.325} \\ &= -1.3424 \end{aligned}$$

and then applying p-value $= 2 \times \Phi(- \mid z \mid)$,

$$p\text{-value} = 0.180$$

b) Using $n = 13$, $\bar{x} = 2.879$, $\sigma = 0.325$, and $\mu \geq 3.1$ and applying the 2-sided z-test from page 369,

$$\begin{aligned} z &= \frac{\sqrt{n}(\bar{x} - \mu_0)}{\sigma} \\ &= \frac{\sqrt{13}(2.879 - 3.1)}{0.325} \\ &= -2.4518 \end{aligned}$$

and then applying p-value $= 2 \times \Phi(- \mid z \mid)$,

$$p\text{-value} = 0.007$$

8.2.9

a) $t_{0.05,60} = 1.671$ so the experimenter *accepts* the null hypothesis $\forall t \mid t \leq 1.671$.

b) $t_{0.005,60} = 2.660$ so the experimenter *accepts* the null hypothesis $\forall t \mid t > 2.660$.

c) Reject at both $\alpha = 0.1$ and $\alpha = 0.01$.

d)

$$\begin{aligned} t &= \frac{\sqrt{61}(0.0768 - 0.065)}{0.0231} \\ &= 3.9897 \\ P(t_{60} \geq 3.9897) &= 0.0001 \end{aligned}$$

8.2.11

$$\begin{aligned} t &= \frac{\sqrt{24}(44.364 - 44.30)}{0.019} \\ &= 3.6098 \\ 2 \times P(t_{23} \geq 3.6098) &= 0.0014 \end{aligned}$$

Miscalibrated.

8.2.21

$$\begin{aligned} t &= \frac{\sqrt{16}(239.13 - 238.5)}{2.8} \\ &= 0.9 \\ P(t_{15} > 0.9) &= 0.191 \end{aligned}$$

There is not sufficient evidence.

10.1.1(d)

Normal approximation:

$$\begin{aligned} z &= \frac{11 - (32 \times 0.5)}{\sqrt{32 \times 0.5 \times (1 - 0.5)}} \\ &= -1.7678 \\ p\text{-value} &= 2 \times \Phi(-1.7678) \\ &= 0.077 \end{aligned}$$

Exact p-value:

$$2 \times P(B(32, 0.5)) = 0.110$$

10.1.7 I have a *cop-out* answer for this question which is, **no**, this is not sufficient evidence. I base this on the technicality that the question states, "over the past five years only 122 out of the 1386 jurors *used*[1] by the court reside in her county." The method of solving the problem **not stated** in problem 10.1.7 would be to calculate the z-value and compare it against the p-value in a manner similar to above.

[1] Italics added by me for emphasis.