Exercise Set #20

Answers to Odd-Numbered Exercises

20-1 (a)

Step 1

H₀:  λ = 0.05
H₁:  λ ≠ 0.05
α = 0.01

Step 2

p = 30/400 = 0.075
z = (p - λ₀) / √(λ₀ (1 - λ₀) / n) = 2.294

Step 3

do not reject H₀

p-value = 0.0220

Step 4

Since z = 2.294 and z₀.005 = 2.576, we do not have sufficient evidence to reject H₀. We conclude that the proportion of defective printed circuits manufactured at the plant is not different from 0.05 (p-value = 0.0220).

(b) Since nλ = 400(0.05) = 20 and n(1 - λ) = 400(1 - 0.05) = 380 are both greater than 5, the z statistic is appropriate.

(c) Since H₀ is not rejected, the Type II error is possible, which is concluding that λ = 0.05 when actually λ ≠ 0.05.

(d) H₀ would have been rejected with α = 0.05 and with α = 0.10.

(e) bar chart or pie chart
Since \( z = -1.823 \) and \( z_{0.025} = 1.960 \), we do not have sufficient evidence to reject \( H_0 \). We conclude that the proportion of the state's licensed drivers who are red-green color blind is not different from 0.15 (\( p \)-value = 0.0688).

(b) Since \( n\lambda = 875(0.15) = 131.25 \) and \( n(1 - \lambda) = 875(1 - 0.15) = 743.75 \) are both greater than 5, the \( z \) statistic is appropriate.

(c) Since \( H_0 \) is not rejected, the Type II error is possible, which is concluding that \( \lambda = 0.15 \) when actually \( \lambda \neq 0.15 \).

(d) \( H_0 \) would not have been rejected with \( \alpha = 0.01 \) but would have been rejected with \( \alpha = 0.10 \).

(e) bar chart or pie chart
20-5 (a) (ii) (b) (ii) (c) (i) (d) (ii)

20-7 (a) FALSE (b) TRUE (c) TRUE

20-9 (a) $H_0$: $\lambda = 0.75$ $H_1$: $\lambda \neq 0.75$

(b) (iv) is the Type I Error. (ii) is the Type II Error.

(c) (i) 0.025 (ii) 0.01

(d) (i) $H_0$ would not be rejected.
(ii) $H_0$ would not be rejected.
(iii) $H_0$ would be rejected.

(e) $H_0$: $\mu = 10$ $H_1$: $\mu \neq 10$

(f) (ii) is the Type I Error. (iv) is the Type II Error.

(g) A weight loss of $-6.1$ lbs. is actually a weight gain of 6.1 lbs.

(h) Since we do not know the value for the standard deviation $\sigma$ in the population of all weight losses, we are not able to calculate

$$z = \frac{\bar{x} - 10}{\sigma / \sqrt{n}}$$