Chapter 14 Examples solutions

Ex 1:

1) Hyptheses

$$\begin{aligned} H_0 : \mu &= 505 \\ H_a : \mu &> 505 \end{aligned}$$

2) Test Statistic

$$\begin{aligned} z &= \frac{528 - 505}{110/\sqrt{100}} \\ &= 2.09 \end{aligned}$$

3) p-value

$$p\text{-value} = 0.0183$$

4) Conclusion p-value is small so reject H_0 in favor of H_a. It appears the mean of those taking the course is higher than average.

Ex 2:

1) Hyptheses

$$\begin{aligned} H_0 : \mu &= 10 \\ H_a : \mu &< 10 \end{aligned}$$

2) Test Statistic

$$\begin{aligned} z &= \frac{9.8 - 10}{0.04/\sqrt{30}} \\ &= -27.39 \end{aligned}$$

3) p-value

$$p\text{-value} \approx 0$$

4) Conclusion p-value is overwhelmingly small, so reject H_0 in favor of H_a that the average blood calcium for young pregnant women is less than other young women.

Ex 3:

1) Hyptheses

$$\begin{aligned} H_0 : \mu &= 115 \\ H_a : \mu &\neq 115 \end{aligned}$$

2) Test Statistic

$$\begin{aligned} z &= \frac{116.2 - 115}{25/\sqrt{25}} \\ &= 0.24 \end{aligned}$$

3) p-value

$$\begin{aligned} p\text{-value} &= 2(0.4052) \\ &= 0.8104 \end{aligned}$$

4) Conclusion p-value is large so fail to reject H_0, there is insufficient evidence to conclude freshman have a score different from 115.

Ex 4:

1) Hyptheses

$$\begin{aligned} H_0 : \mu &= 16 \\ H_a : \mu &\neq 16 \end{aligned}$$

2) Test Statistic

$$\begin{aligned} z &= \frac{15.7 - 16}{1/\sqrt{64}} \\ &= -2.4 \end{aligned}$$

3) p-value

$$\begin{aligned} p\text{-value} &= 2(0.0082) \\ &= 0.0164 \end{aligned}$$

4) Conclusion p-value is small (eg., p-value¡0.05) so reject H_0 in favor of H_a that the machine is out of calibration.

Ex 5:

1) Hyptheses

$$\begin{aligned} H_0 : \mu &= 3.5 \\ H_a : \mu &< 3.5 \end{aligned}$$

2) Test Statistic

$$\begin{aligned} z &= \frac{3.33 - 3.5}{1/\sqrt{100}} \\ &= -1.7 \end{aligned}$$

3) p-value

$$p\text{-value} = 0.0446$$

4) Conclusion p-value is small (eg., p-value¡0.05) so reject H_0 in favor of H_a that the farmer is shortchanging the processing plant — and good for him!