

White  
Key

AMS 7: Quiz 3

Full Name: \_\_\_\_\_

Discussion Day & Time: \_\_\_\_\_

Dr. Immanuel Williams, May 18, 2017

This Quiz is worth a total of 20 points.

Answer each question to the best of your ability. Be sure to stay positive.

There is a backside to this quiz.

$n$

1. A group of 900 horses were fed a new protein grain for a week. A random sample of 36 horses were weighted and average weight gained was 3.2 kg. If the entire group of 900 horses standard deviation was 1.1 kg, test the hypothesis that the average weight gain for the week was greater than 2.8 kg, with a significance level of 0.05.

15

State the null and alternative hypotheses using the correct symbolization. (3 points)

$$H_0: \mu = 2.8$$

$$H_a: \mu > 2.8$$

What is the level of significance level in this problem? (1 points)

$$\alpha = 0.05$$

What can be found using the significance level to determine when to reject or fail to reject the null hypothesis? (2 points)

Critical value of the test statistic (z in this case)

If the p-value is greater than  $\alpha$ , what would you decide to do to the null hypothesis? (1 points)

Fail to reject  $H_0$

Calculate the test statistic for this problem. (3 points)

$$Z = \frac{\bar{X} - \mu_0}{\sqrt{\frac{\sigma^2}{n}}} = \frac{3.2 - 2.8}{\sqrt{\frac{(1.1)^2}{36}}} = \frac{(0.4)6}{1.1} = 2.1818$$

Which distribution would you use to find the p-value? (2 points)

Normal ( $\sigma^2$  is known)

If the critical value was 1.645, what would you do to the null hypothesis? (2 points)

Reject  $H_0$  because  $|Z| > 1.645$

What kind of error could you possibly be making? (1 points)

Type I (we rejected  $H_0$ , but it may be true)

2. Find a 90% confidence interval for the average weight gain of the horse. Use 1.645 as the critical value.

5

$$\begin{aligned} & \bar{X} \pm 1.645 \sqrt{\frac{\sigma^2}{n}} \\ & = 3.2 \pm 1.645 \sqrt{\frac{(1.1)^2}{36}} \\ & = 3.2 \pm 1.645 \left(\frac{1.1}{6}\right) \\ & = 3.2 \pm 0.30158 \end{aligned}$$

$$\text{C.I. } (2.898, 3.502)$$

Yellow  
Key

Answer each question to the best of your ability. Be sure to stay positive.

There is a backside to this quiz.

n

1. A group of 900 horses were fed a new protein grain for a week. A random sample of 36 horses were weighted and average weight gained was 3.2 kg. If the entire group of 900 horses standard deviation was 4 kg, test the hypothesis that the average weight gain for the week was greater than 3.1 kg, with a significance level of 0.01.

15

State the null and alternative hypotheses using the correct symbolization. (3 points)

$$H_0: \mu = 3.1$$

$$H_a: \mu > 3.1$$

What is the level of significance level in this problem? (1 points)

$$\alpha = 0.01$$

What can be found using the significance level to determine when to reject or fail to reject the null hypothesis? (2 points)

Critical value of the  
test statistic (Z in this case)

If the p-value is less than  $\alpha$ , what would you decide to do to the null hypothesis? (1 points)

Reject  $H_0$ .

Calculate the test statistic for this problem. (3 points)

$$Z = \frac{\bar{X} - \mu_0}{\sqrt{\frac{\sigma^2}{n}}} = \frac{3.2 - 3.1}{\sqrt{\frac{4^2}{36}}} = \frac{0.1(6)}{4} = 0.15$$

Which distribution would you use to find the p-value? (2 points)

Normal ( $\sigma^2$  is known)

If the critical value was 1.96, what would you do to the null hypothesis? (2 points)

Fail to reject because  $|Z| < 1.96$

What kind of error could you possibly be making? (1 points)

Type II (we failed to reject  $H_0$ , but it may be false)

2. Find a 95% confidence interval for the average weight gain of the horse. Use 1.96 as the critical value.

5

$$\begin{aligned} & \bar{X} \pm 1.96 \sqrt{\frac{s^2}{n}} \\ &= 3.2 \pm 1.96 \sqrt{\frac{4^2}{36}} \\ &= 3.2 \pm 1.96 \left(\frac{4}{6}\right) \\ &= 3.2 \pm 1.30\bar{6} \end{aligned}$$

$$\text{C.I. } (1.89\bar{3}, 4.50\bar{6})$$