QSci 482 – Group Quiz 2

KEY

Names:

1. One of the properties of the t-distribution is that it is leptokurtic (heavy tails). What does this tell us about the probability of observing outliers in the sample population? (2 pts.)

There is a higher probability of observing outliers in the sample population.

2. What is the difference between parameters and statistics? (2 pts.)

A parameter describes or characterizes a population. A statistic is an estimate of a population parameter based on a sample.

3. What is a type I error (α)? What is a type II error (β)? (2pts.)

Type I: Rejection of a null hypothesis that is actually true.

Type II: failure to reject a null hypothesis that is actually false.

4. A biologist is concerned that the reintroduction of wolves will increase stress in elk in Yellowstone National Park, as measured by ng/ml of corticosterone in the blood. Corticosterone levels averaged 20ng/ml for elk in the park prior to the reintroduction of wolves. The average corticosterone level for 20 elk sampled one month after the wolf reintroduction was 23ng/ml with a standard deviation = 5.

a. What hypothesis should the biologist test with this data? (2pts.)

$H_0: \mu \leq \mu_0 = 20$

$H_a: \mu > \mu_0 = 20$

b. Test the hypothesis from part (a.) and report the *p*-value [Draw a picture of the PDF]. What do the results suggest about the effect of wolves on corticosterone levels in elk? (2pts.)

$t_{obs} = \frac{23-20}{5/\sqrt{20}} = \frac{3}{1.118} = 2.68$ $\quad 0.01 > p > 0.005$

If $\alpha = 0.05$, we reject the null hypothesis. There is good evidence to suggest that wolves increase stress in elk.

Useful info: $Z = (X-\mu)/\sigma$ $\quad Z = (\bar{x}-\mu)/\sigma_{\bar{x}}$ $\quad cv = (s/\bar{x})*100$ $\quad t_{obs} = (\bar{x}-\mu_0)/s_{\bar{x}} \sim t_{n-1}$

$s^2 = [\Sigma (x_i - \bar{x})^2]/(n-1)$ $\quad se = s/\sqrt{n}$