### Assignment 3

The due date for submitting this assignment has passed. 
As per our records you have not submitted this assignment.

#### 1) If $R_C$ is the critical region and $Q_T$ is the test statistic, which of the following is/are FALSE regarding Type I and Type II errors?

- Type I error is $\Pr(Q_T \in R_C | H_0$ true)
- Type II error is $\Pr(Q_T \in R_C | H_0$ false)
- Type I error is $\Pr(Q_T \notin R_C | H_0$ true)
- Type II error is $\Pr(Q_T \notin R_C | H_0$ false)

No, the answer is incorrect.

**Score:** 0

**Accepted Answers:**
- Type II error is $\Pr(Q_T \notin R_C | H_0$ true)
- Type I error is $\Pr(Q_T \in R_C | H_0$ false)

#### 2) A textile fiber manufacturer is investigating a new drapery yarn, which the company claims has a mean thread elongation of 12 kilograms with a standard deviation of 0.5 kilograms. The company wishes to test the hypothesis $H_0 : \mu = 12$ against $H_1 : \mu < 12$, using a random sample of four specimens. What is the Type I error probability if the critical region is defined as $\bar{x} < 11.5$ kilograms?

- 0.0227
- 0.0158
- 0.5
- 0.1124

No, the answer is incorrect.

**Score:** 0

**Accepted Answers:**
- 0.0227

#### 3) In Question 2, find $\beta$ (Type II error) for the case in which the true mean is 11.5 kilograms?

- 0.0213
- 0.5
- 0.0575
- 0.1022

No, the answer is incorrect.

**Score:** 0

**Accepted Answers:**
- 0.5

#### 4) A consumer products company is formulating a new shampoo and is interested in foam height (in millimeters). Foam height is approximately normally distributed and has a standard deviation of 20 millimeters. The company wishes to test the hypothesis $H_0 : \mu = 180$ millimeters versus $H_1 : \mu > 180$ millimeters, using the results of $n = 10$ specimens. Find the Type I error probability $\alpha$ if the critical region is $\bar{x} > 185$.

- 0.021
- 0.015
- 0.057
- 0.214

No, the answer is incorrect.

**Score:** 0

**Accepted Answers:**
- 0.214

#### 5) In Question 4, determine the $P$-value if the observed statistic is $\bar{x} = 185$ millimeters.

- 0.215
- 0.542
- 0.142
- 0.115

No, the answer is incorrect.

**Score:** 0
6) A manufacturer is interested in the output voltage of a power supply used in a PC. Output voltage is assumed to be normally distributed with standard deviation 0.25 volt, and the manufacturer wishes to test $H_0 : \mu = 5$ volts against $H_1 : \mu \neq 5$ volts, using $n = 8$ units. Calculate the $P$-value if the observed statistic is $\bar{x} = 5.2$

- 0.088
- 0.022
- 0.016
- 0.066

No, the answer is incorrect.
Score: 0

Accepted Answers:
0.022

7) The diameter of steel rods manufactured on two different extrusion machines is being investigated. Two random samples of sizes $n_1 = 17$ and $n_2 = 17$ are selected, and the sample means and sample variances are $\bar{x}_1 = 8.73$, $s^2_1 = 0.35$, $\bar{x}_2 = 8.68$ and $s^2_2 = 0.40$ respectively. Assume that $\sigma^2_1 = \sigma^2_2$ and that the data are drawn from a normal distribution. Answer the following with respect to the claim that the two machines produce rods with different mean diameters.

The value of the appropriate test statistic computed for the given problem rounded off to two decimal places is

No, the answer is incorrect.
Score: 0

Accepted Answers:
(Type: Numeric) 0.23

8) In Question 7, is there evidence to support the claim that the two machines produce rods with different mean diameters? (fill 1 for yes and 0 for no). Use $\alpha = 0.05$ for drawing the conclusion.

No, the answer is incorrect.
Score: 0

Accepted Answers:
(Type: Numeric) 0

9) Fifteen adult males between the ages of 35 and 50 participated in a study to evaluate the effect of diet and exercise on blood cholesterol levels. The total cholesterol was measured in each subject initially and then three months after participating in an aerobic exercise program and switching to a low-fat diet. The data are shown in the accompanying table. Here, it is claimed that low-fat diet and aerobic exercise are of value in producing a mean reduction in blood cholesterol levels.

Which of the following is/are TRUE for the given problem?

- The problem does not require a paired $t$-test.
- The problem requires a paired $t$-test.
- The appropriate test statistic value is 4.57.
- The appropriate test statistic value is 5.47.

No, the answer is incorrect.
Score: 0

Accepted Answers:
The problem requires a paired $t$-test.
The appropriate test statistic value is 5.47.

10) Two different types of injection-molding machines are used to form plastic parts. A part is considered defective if it has excessive shrinkage or is discolored. Two random samples, one of size 300, and other equal to 150 are selected, and 15 defective parts are found in the sample from machine 1 while 8 defective parts are found in the sample from machine 2. Here it is required to test if both machines produce the same fraction of defective parts. The $P$-value for this test rounded off to two decimal places is

No, the answer is incorrect.
Score: 0

Accepted Answers:
(Type: Numeric) 0.88