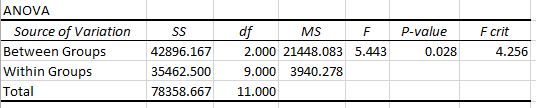
IEE 380 Sample Exam 2

There are 22 questions on this exam. Each one is worth 5 points. You can score over 100 on this exam. Rip the exam sheet and scrap paper from the answer sheet and put your answers on the answer sheet only. If the answer you obtain is not one of the multiple choice answers, SELECT THE ANSWER CLOSEST TO YOURS (i.e., the minimum absolute difference). No partial credit. Circle the correct answers on the answer sheet. Good luck!

1. What is your 3-digit IEE 380 PIN?
2. Determine the value of A such that P(F > A) = .99, where F has u = 10 and v = 15 degrees of freedom.
3. The number of surface flaws in a plastic roll used in the interior of automobiles has a Poisson distribution with a mean of 0.06 flaws per square foot of plastic roll. Assume an automobile interior contains 12 square feet of plastic roll. If 10 cars are sold to a rental company, what is the probability that at most 3 cars have at least one surface flaw?
4. Consider the following hypothesis test: H0:  = 0 H1: 1 – 2 > 0 If we fail to reject the null hypothesis, what number must be contained in the 95% confidence interval?
5. What of the statements is TRUE about ? Place an X next to the (one) correct answer.
6. On Tue 3/17 in class, I analyzed Exam 1 data to demonstrate Case 1 of Chapter 5. Which two majors did I use in my example? Place an X next to the (one) one correct answer.

Questions 7 and 8 are based on the following: For a class project, four students prepared popcorn in a similar fashion using the same amount of popcorn and three different oils, then counted the number of unpopped kernels remaining after cooking. The students wanted to know if the number of unpopped kernels was different depending on the oil used. The table showing number of unpopped kernels and the Excel output are below.

|  |  |  |
| --- | --- | --- |
| Vegetable | Canola | Safflower |
| 336 | 544 | 381 |
| 453 | 577 | 404 |
| 468 | 498 | 504 |
| 516 | 631 | 428 |



1. Select the one correct statement that finishes this sentence correctly: This is a…
2. What will be the conclusion? Place an X next to the one best answer. Use a Type I error probability of .05.
3. Which of the statements is TRUE about Type I error? Place an X next to the (one) correct answer.

Questions 10 and 11 are based upon the following: In the mid-1990s, a vaccine for chicken pox was tested for safety. A sample of 89,753 people were given the vaccine and monitored for side effects and complications. From this sample, 39 people developed complications. Perform a hypothesis test to determine if the probability of developing complications from the chicken pox vaccine is less than .005.

1. What is the numerical value of your test statistic?
2. Place an X next to the one correct conclusion.

1. A sample of 41 resistors is taken and the sample variance was .982 ohms2. Determine L and U such that P(L < 2 < U) = .95
2. What experiment did we do in class with 5 volunteers who came up on stage to demonstrate a Paired T-Test? Place an X next to the (one) correct answer.

Questions 14 and 15 are based on the following: Output voltage is assumed to be normally distributed. The standard deviation of the output voltage is .840 volts. A sample of 16 voltages are measured. A hypothesis test is performed to determine if the population mean is 9 volts or not. H0 will be rejected if the sample mean of these 16 items is less than 8.459 volts or greater than 9.541 volts.

1. What is the numerical value of the variance of the sample mean expressed to 4 decimal places?
2. What  is being used in this hypothesis test?
3. Recall the class in which I explained the differences between Type I error and Type II error as part of Ch. 4. What analogies did I use in class as part of my explanation? Place an X next to the one correct answer.
4. Consider the following hypothesis test:  If we fail to reject the null hypothesis, what number must be contained in the 95% confidence interval on the ratio of the two variances?
5. Chemical Process Part I. The yield of a chemical process is being studied. From previous experience with this process the standard deviation of yield is known to be 2.9. The past 5 days of plant operation have resulted in the following yields (given in percentages): 91.6, 88.75, 90.8, 89.95 and 91.3%. Process engineers test the hypothesis that the mean yield is bigger than 90% using  = .01. If the true mean yield is 91%, what is probability that they fail to reject H0 if H0 is false?

Questions 19 and 20 are based on the following: The Universal Pain Assessment Tool is a standardized rating used by medical professionals to assess the severity of pain. Patients rate their pain on a scale of pain units, 1 to 10, with 10 being the worst pain in their life. Six back pain patients came to a pain clinic and rated their pain before and after being given a fast-acting new drug called Drug X. Analysts wish to test the hypothesis that Drug X reduces pain by at least 2 pain units. Results are below:

19. What is the absolute value of the test statistic that will be used?

20. What will be the conclusion? Place an X next to the best way to tell a boss what the conclusion.

|  |  |  |
| --- | --- | --- |
| Patient ID | Pain Before  Drug X | Pain After  Drug X |
| 1 | 6 | 3 |
| 2 | 7 | 6 |
| 3 | 7 | 4 |
| 4 | 6 | 4 |
| 5 | 8 | 5 |
| 6 | 7 | 4 |

Questions 21 and 22 are based on the following: The yield of a chemical process is being studied. The past 5 days of plant operation have resulted in the following yields (given in percentages): 91.6, 88.75, 90.8, 89.95 and 91.3%. Perform a hypothesis test to determine if the population mean is larger than 90%.

21. What is the numerical value of your test statistic?

22. What is your conclusion? Place an X next to the choice that best completes the statement of your (one) correct conclusion: ***There is statistically significant evidence that the population mean is….***

**IEE 380 Exam 2 3-digit PIN: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Printed Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Major: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ TURN IN ONLY THIS SHEET**

*I understand ASU’s Academic Integrity Policy. I understand what a violation is during this exam. I understand the penalties and consequences if I am found to have violated this policy in any way.*

***Signature: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_***

|  |
| --- |
|  |
| 1. .219 .263 .421 1.233 3.800 4.560 |
| 1. .135 .151 .359 .641 .849 .985 |
| 1. 0 .025 .050 .950 .975 1 |
| 1. \_\_\_It is equal to 1 -  \_\_\_It is Type II error.   \_\_\_It occurs when H0 is rejected when H0 is false. \_\_\_It occurs when we fail to reject H0 when it is false.  \_\_\_It is the probability that we fail to reject H0 when it is false. \_\_\_It is the probability that we fail to reject H0 when it is true. |
| 1. \_\_\_Computer Science (CS) and Computer Systems Engineering (CSE) \_\_\_Civil Engineering (CEE) and Computer Science (CS)   \_\_\_Industrial Engineering (IEE) and Engineering Management (EM) \_\_\_Mechanical Engineering (MAE) and Material Science Engineering (MSE)  \_\_\_Industrial Engineering (IEE) and Computer Systems Engineering (CSE) \_\_\_Civil Engineering (CEE) and Electrical Engineering (EEE) |
| 1. \_\_\_…paired T-Test \_\_\_…test of hypothesis on the ratio of two variances \_\_\_…randomized block experiment   \_\_\_…completely randomized experiment \_\_\_…binomial random variable model \_\_\_…none of these previous choices is correct |
| 1. \_\_\_The mean number of unpopped kernels is the same for each oil \_\_\_The mean number of unpopped kernels is different for at least one oil   \_\_\_The mean number of unpopped kernels is different for exactly one oil \_\_\_The mean number of unpopped kernels is the same for exactly two of the oils  \_\_\_One of the oils is better than the other two. \_\_\_One of the oils is worse than the other two. |
| 1. \_\_\_It is equal to 1 - \_\_\_It is    \_\_\_It occurs when H0 is rejected when H0 is true. \_\_\_It occurs when H0 is rejected when H0 is false.  \_\_\_It occurs when we fail to reject H0 when it is true. \_\_\_It occurs when we fail to reject H0 when it is false. |
| 1. -19.392 -18.939 -16.756 1.207 1.891 2.349 |
| 1. \_\_\_The probability of developing complications from the vaccine is equal to .005   \_\_\_The probability of developing complications from the vaccine is less than .005  \_\_\_The probability of developing complications from the vaccine is bigger than .005  \_\_\_The probability of developing complications from the vaccine is equal to .00043  \_\_\_The probability of developing complications from the vaccine is less than .00043  \_\_\_The probability of developing complications from the vaccine is bigger than .00043 |
| 1. \_\_\_L = .264, U = 1.202 \_\_\_L = .688, U = 1.670 \_\_\_L = .111, U = .989   \_\_\_L = .555, U = 1.781 \_\_\_L = .549, U = 2.136 \_\_\_L = .662, U = 1.609 |
| 1. \_\_\_GPA differences between men and women   \_\_\_Blindfolded obstacle course times  \_\_\_Heart rate increase with public speaking  \_\_\_Difference in number of sit-ups between CS and CSE majors  \_\_\_Proportion of eyeglass wearers to contact lens wearers  \_\_\_Difference in longboard length between left side of room and right side of room |
| 1. .0441 .2100 .2500 .3600 .4404 .6988 |
| 1. .005 .010 .025 .050 .950 .990 |
| 1. \_\_\_Type I error: pregnancy ultrasound says “girl” but it’s a boy; Type II error: pregnancy ultrasound says “boy” and it’s a girl.   \_\_\_Type I error: HIV drug increases lifespan; Type II error: HIV drug does not increase lifespan  \_\_\_Type I error: convicting an innocent man; Type II error: letting a guilty man go free  \_\_\_Type I error: blood alcohol content is < .08; Type II error: blood alcohol content is > .08  \_\_\_Type I error: C student received a D grade; Type II error: D student receives a C grade  \_\_\_Type I error: cheating IEE 380 student is found not guilty by dean’s office; Type II error: innocent IEE 380 student is  found guilty by dean’s office |
| 1. 0 .025 .050 .950 .975 1 |
| 1. .216 .327 .541 .632 .784 .999 |
| 1. 1.464 2.335 3.008 4.792 5.102 5.967 |
| 1. \_\_\_Drug X does not reduce pain by at least 2 pain units \_\_\_Drug X reduces pain by less than 3 pain units   \_\_\_Drug X reduces pain by at least 3 pain units \_\_\_There is no difference in pain units after Drug X  \_\_\_Drug X increases pain by at least 2 units \_\_\_Drug X increases pain by less than 3 pain units |
| 1. .202 .673 .932 1.285 1.774 2.063 |
| 1. *\_\_\_... larger than 91.6% \_\_\_ …larger than 90%.*   *\_\_\_ …equal to 90% \_\_\_... smaller than 88.75%*  *\_\_\_... is equal to the sample variance \_\_\_... is equal to any sample mean of n = 5* |

Answers

