Exam 2 Fall 2017

1) The smaller the p-value, the more we doubt the null hypothesis.
    a) True
    b) False

2) You cannot make a Type II error when the null hypothesis is true.
    a) True
    b) False

3) The *t* distribution is positively skewed.
    a) True
    b) False

4) The central limit theorem can be applied to both discrete and continuous random variables.
    a) True
    b) False

5) In order to determine the p-value, it is unnecessary to know the level of significance.
    a) True
    b) False

6) If the sample size is large enough, almost any null hypothesis can be rejected.
    a) True
    b) False

7) According to the central limit theorem, the standard deviation of the distribution of sample means will be the original population standard deviation divided by n (the sample size).
    a) True
    b) False

8) The statement, "the 95% confidence interval for the population mean is (350, 400)", is equivalent to the statement, "there is a 95% probability that the population mean is between 350 and 400".
    a) True
    b) False

9) In which of the following situations is the Central Limit Theorem not applicable?

a) When the sample is small and the population is normal.
b) When the sample is large and the population is normal.
c) When the sample is large, above 30, and the population is not normal.
d) When the sample is small, below 30, and the population is not normal.
e) none of the above

10) The length of time of long-distance telephone calls has mean of 18 minutes and standard deviation of 7 minutes. Suppose a sample of 49 telephone calls is used to reflect on the population of all long-distance calls. What is the chance that the average of the 49 calls is between 10 and 17 minutes?

a) 0.93
b) 0.32
c) 0.12
d) 0.16
e) 0.52

11) By measuring the amount of time it takes a component to move from one work station to the next, an engineer has estimated that the standard deviation is 7.0 seconds. How many measurements should be taken so the 95% confidence interval will be +/- 0.8 seconds?

a) 295
b) 389
c) 180
d) 629
e) 420

12) In a local precinct 500 of the voters are selected at random and asked to indicate whether they planned to vote for the Democratic incumbent or the Republican challenger. Of the 500 surveyed, 350 said they were going to vote for the Democratic incumbent. Using the 0.95 confidence coefficient, what is the upper limit of the 95% confidence interval for the proportion that plan to vote for the Democratic incumbent?

a) 0.70
b) 0.83
c) 0.88
d) 0.78
e) 0.74

13) The proportion of junior executives leaving large manufacturing companies within three years is to be estimated within 3 percent. A study conducted several years ago revealed that the percent of junior executives leaving within three years was 21%. To update this study, the files of how many junior executives should be studied?

a) 594
b) 612
c) 709
d) 897
e) 1021

14) Suppose the manager of a pet supply store wants to determine if there is a difference in the amount of money spent, on the average, by owners of dogs vs. owners of cats. (Customers who own multiple pets were disregarded in this analysis.) The results for a sample of 37 dog owners were an average of $26.47, and a standard deviation of $9.45. The results for a sample of 26 cat owners were an average of $19.16, and a standard deviation of $8.52. What is the value of the denominator of the test statistic for testing the two means are equal?

a) 2.13
b) 1.64
c) 2.61
d) 1.96
e) 2.28

15) Test at the 0.05 level the statement that 55% of those families who plan to purchase a vacation residence in Florida want a condominium. The null hypothesis is $p = 0.55$ and the alternate is $p \neq 0.55$. A random sample of 400 families who planned to buy a vacation residence revealed that 228 families want a condominium. What decision should be made regarding the null hypothesis?

a) Do not reject it
b) Reject it
c) Cannot accept nor reject it based on the information given
d) None of the above

16) A random sample of 85 group leaders, supervisors, and similar personnel revealed that a person spent an average 6.5 years on the job before being promoted with a standard deviation of 1.7 years. Using the 0.95 degree of confidence, what is the upper bound of the confidence interval for the population mean?

a) 6.99
b) 7.15
c) 6.86
d) 7.49
e) 7.23

17) Thirty bottles of a certain manufacturer's cabernet wine were selected at random and analyzed for alcohol content. A 95% confidence interval for the population mean alcohol content of such bottles of wine is (9.92%, 11.07%). Does the sample mean lie in the interval (9.92, 11.07)?

a) Yes
b) No
c) Can't tell

18) Thirty bottles of a certain manufacturer's cabernet wine were selected at random and analyzed for alcohol content. A 95% confidence interval for the population mean alcohol content of such bottles of wine is (9.92%, 11.07%). Does the population mean lie in the interval (9.92, 11.07)?

a) Yes
b) No
c) Can't tell

19) Thirty bottles of a certain manufacturer's cabernet wine were selected at random and analyzed for alcohol content. A 95% confidence interval for the population mean alcohol content of such bottles of wine is (9.92%, 11.07%). If we use a 99% confidence level, will the confidence interval calculation from the same data produce an interval narrower than (9.92, 11.07)?

a) Yes
b) No
c) Can't tell

20) If asset A has a variance of 49 while asset B has a variance of 36 while the correlation coefficient of their returns is 0.75, the covariance of the returns of the two assets is:

a) 1323

b) 31.5
c) 9.75
d) 63.75
e) 13.75

21) Two assets have variances of 24 (asset A) and 45 (asset B). The covariance between them is 15. If a portfolio is composed of the two assets in the proportions 70% in A and 30% in B the portfolio standard deviation will be:

a) 4.7
b) 11.6
c) 22.11
d) 30.3
e) 69

22) In a large population, 46% of the households own DVD recorders. A simple random sample of 100 households from this population is to be contacted and the sample proportion computed. Which of the following expressions represents the probability that more than half the households sampled will own a DVD recorder?

a) 0.05
b) 0.12
c) 0.21
d) 0.31
e) 0.69

23) It is believed that there are the same amount of Skittles of every color in a bag. One statistics student decides to count the number of Skittles in his bag. Here are the number of Skittles he counted for each color: Purple: 10,Yellow: 8, Green: 12, Orange: 11, Red: 9. The chi-square goodness of fit statistic is then

a) 1
b) 2
c) 3
d) 4
e) 5

24) Suppose you are testing the following hypothesis: Ho: $\mu = 100$ vs. Ha: $\mu > 100$. A sample average of less than 100 would sometimes lead to a _____ error but would never lead to a _____ error.

a) Type I; Type II
b) Type II; Type I
c) Type I; p-value
d) p-value; Type II
e) Random; Non-Random

25) The following table gives the joint distribution for the annual returns on an asset *X* and another asset *Y*. Note that *X* and *Y* are both discrete random variables. Compute E(X|Y=3)

	X=0	X=1	X=3
Y=-1	0.11	0.03	0.00
Y=2.5	0.03	0.09	0.16
Y=3	0.15	0.15	0.06
Y=4.7	0.04	0.16	0.02

a) 1.04
b) 0.92
c) 1.10
d) 2.20
e) 0.81

26) A process is considered to be performing acceptably if its mean is 200. Because it is expensive to shut down and reconfigure this process, such measures are undertaken only if there is compelling evidence that the process mean is not 200. Suppose we decide to test the hypothesis Ho: $\mu = 200$ vs. Ha: $\mu \neq 200$. In this situation, a Type I error would be made when it is concluded that μ is _____ 200 when in fact μ _____ 200.

a) Greater than; less than or equal to
b) Less than; greater than or equal to
c) Equal to; greater than
d) Not equal to; equals
e) Equals; not equal to

27) The average cost of tuition, room and board at small private liberal arts colleges is reported to be $8,500 per term, but a financial administrator believes that the average cost is higher. A study conducted using 350 small liberal arts colleges showed that the average cost per term is $8,745 with a standard deviation of $1,200. What is the value

of the appropriate test statistic for this hypothesis test at the 0.05 significance level?

a) 2.57
b) 1.96
c) 3.82
d) 1.79
e) 4.67

28) What is the result of the hypothesis test in the previous question?
    a) Reject the null hypothesis
    b) Fail to reject the null hypothesis

29) A pharmaceutical company has developed a new drug to reduce cholesterol. The company collected data by giving the new drug to a random sample of 50 people from the population of people with high cholesterol. The reduction in cholesterol level after one month of use was recorded for each individual in the sample, resulting in a sample mean reduction and standard deviation of 24 mg/dl and 15 mg/dl respectively. A 99% confidence interval for the population mean reduction in cholesterol level for the new drug is found to be (19.737, 28.263). Interpret what it means to be "99% confident" in this interval.

    a) There is a 99% probability that the population mean reduction in cholesterol level for the new drug is contained in the interval 19.737 to 28.263.
    b) In repeated sampling, using the same method used to create the interval 19.737 to 28.263, 99% of the intervals created will capture the population mean reduction in cholesterol level for the new drug.
    c) In repeated sampling, 99% of the sample means calculated will fall in the interval 19.737 to 28.263.
    d) There is a 99% chance that the interval 19.737 to 28.263 will capture the mean reduction in cholesterol level for the new drug of the 50 people sampled.

30) In a study to see if a new variety of popcorn pops faster than the old variety, we collected the following data on time to complete popping in minutes. For the old variety, 30 bags popped in 12 minutes with a standard deviation of 3 minutes and for the new variety 30 bags popped in 10 minutes with a standard deviation of 4 minutes.

Based on the R output, which of the following is true?

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> tsum.test(mean.x=12,s.x=3,n.x=30,mean.y=10,s.y=4,n.y=30)

        Welch Modified Two-Sample t-Test

data:  Summarized x and y
t = 2.1909, df = 53.783, p-value = 0.03281
alternative hypothesis: true difference in means is not equal to 0
95 percent confidence interval:
 0.1696351 3.8303649
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a) We would reject the null hypothesis
b) Not enough information to decide
c) We would fail to reject the null hypothesis

31) Which one of the following statements does not refer to the Central Limit Theorem?

a) The expected value of the mean of the distribution of sample means is μ.
b) If the sample size is large, the distribution of sample means is approximately normally distributed.
c) The Central Limit Theorem is true for any distribution, when the sample size is at least 30.
d) The standard deviation of the distribution of sample means is equal to σ.
e) When a non-normal population is sampled, the distribution of sample means is still normally distributed, as long as the sample size is large.

32) Suppose the weight of a randomly picked Adams resident is normally distributed with mean 140 and standard deviation 20. Suppose the weight of a randomly picked Quincy house resident is normally distributed with mean 130 and standard deviation 15. What is the probability an Adams house resident weighs more than a Quincy house resident?

a) 0.14
b) 0.36
c) 0.27
d) 0.66
e) 0.75

33) In 2006, the General Social Survey asked respondents "Should divorce in this country be easier or more difficult to obtain than it is now?" In testing Ho: Pm = Pf versus Ha: Pm > Pf, where Pm is the proportion of males who responded "more difficult" and Pf is the proportion of females who responded "more difficult", suppose the test statistic is T = 0.33. What is your conclusion using a significance level of 0.05?

a) Since T < 1.64, we reject the null hypothesis and conclude that the proportion of males who responded "more difficult" is greater than the proportion of females who responded "more difficult".
b) Since T < 1.64, we reject the null hypothesis and conclude that the proportion of females who responded "more difficult" is greater than the proportion of males who responded "more difficult".
c) Since T = 0.33 is greater than 0.05, we reject the null hypothesis and conclude that the proportion of males who responded "more difficult" is greater than the proportion of females who responded "more difficult".
d) Since T < 1.64, we are unable to reject the null hypothesis. There is insufficient evidence to show that the proportion of males who responded "more difficult" is greater than the proportion of females who responded "more difficult".
e) Since T = 0.33 is greater than 0.05, we reject the null hypothesis and conclude that the proportion of females who responded "more difficult" is greater than the proportion of males who responded "more difficult".

34) In an ANOVA, we find that the p-value is 0.003. We therefore conclude that:

a) there is no statistical evidence that any population mean is different from any other
b) no two population means are equal
c) no two variances are equal
d) the null hypothesis should be accepted
e) there is strong statistical evidence that not all the population means are equal

35) All other things remaining constant, if the sample size increases by a factor of nine then the confidence interval for the population mean will:

a) Become one-ninth as wide.
b) Become nine times as wide.
c) Triple in width.
d) Become one-third as wide.

36) Consider the following joint probability distribution. Calculate E(2X+5Y).

			X	
		0	1	2
	0	0.17	0.08	0.08
Y	1	0.00	0.17	0.33
	2	0.00	0.00	0.17

a) 6.51
b) 8.32
c) 5.28
d) 7.02
e) 9.04

37) In a recent Gallup poll on a random sample of 1,028 US adults, 11% said they approve of the way the Congress is handling its job, with a 95% confidence interval of 7% to 15%. Which of the following statements is/are true based on the confidence interval?

(i) The population proportion is 0.11.
(ii) The sample proportion is 0.11.
(iii) The margin of error is 0.04.
(iv) 95% of random samples will have sample proportions between 0.07 and 0.15.
(v) It is possible that the population proportion is 0.18.

a) They all are true
b) None of them are true
c) (i), (iii) and (iv) are true
d) (ii), (iv) and (v) are true
e) (ii), (iii) and (v) are true
f) None of the above

Answers:

1) A
2) A
3) B
4) A
5) A
6) A
7) B
8) B
9) D
10) D
11) A
12) E
13) C
14) E
15) A
16) C
17) A
18) C
19) B
20) B
21) A
22) C
23) A
24) B
25) B
26) D
27) C
28) A
29) B
30) A
31) D
32) D
33) D
34) E
35) D
36) D
37) E