Final Exam Stats

Name_____

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

Form a conclusion about statistical significance. Do not make any formal calculations. Either use the results provided or make subjective judgments about the results.

1) Charlie's teacher claims that he does not study and just guesses on exams. On an exam with 201 true-false questions, Charlie answered 53.7% of the questions correctly. Calculations using these results show that if he were really just guessing, there would be roughly 1 chance in 7 that he would do this well. Is there statistically significant evidence against the teacher's claim that Charlie is just guessing? Why or why not? Be specific! 1) _____

No, the exam result of 53.7% is not substantially greater than 50%. Even if Charlie was just guessing he could do this well by chance

2

$H_0: p = 0.5$

$H_1: p > 0.5$

P-Value = 0.1428 $> \alpha$

There is not sufficient evidence to warrant rejection of the claim that he is guessing.

Find the mean and the standard deviation for the given sample data. Round your answer to one more decimal place than is present in the original data.

2) The numbers listed below represent the amount of precipitation (in inches) last year in six different U.S. cities. 2) _____

14.7 15.1 31.6 42.6 17.7 18.8

2

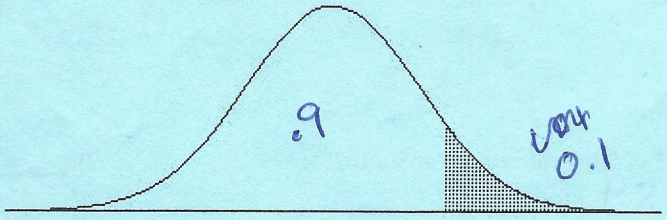
$\bar{x} = 23.42 \approx 23.4$

$s = 11.26 \approx 11.3$

Provide an appropriate response.

3) Find the indicated IQ score. The graph depicts IQ scores of adults, and those scores are normally distributed with a mean of 100 and a standard deviation of 15 (as on the Wechsler test). 3) _____

2

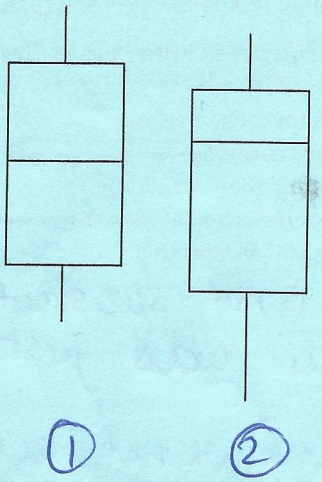


The shaded area under the curve is 0.10.

invnorm(.9, 100, 15)
= 119.22

4) Describe any similarities or differences in the two distributions represented by the following boxplots. Assume the two boxplots have the same scale. Use the 5 number summary to compare. What kind of distribution does each boxplot represent. Be specific! 4) _____

2



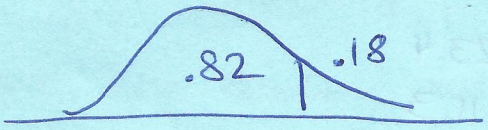
① Normal distribution
higher min, Q_1, Q_3, max

② left skewed
higher med
larger range

Solve the problem. Round to the nearest tenth unless indicated otherwise.

5) Suppose that replacement times for washing machines are normally distributed with a mean of 8.4 years and a standard deviation of 2 years. Find the replacement time that separates the top 18% from the bottom 82%. (Draw a curve and label it) 5) 10.23

2



invnorm(.82, 8.4, 2)
10.23

Solve the problem.

6) A musician plans to perform 8 selections. In how many ways can she arrange the musical selections? 6) _____

$8! = 40{,}320$

2

7) How many ways can an IRS auditor select 3 of 9 tax returns for an audit? 7) _____

$9C3 = 84$

2 Does the order matter? No

Use the traditional method of hypothesis testing to test the given claim about the means of two populations. Assume that two dependent samples have been randomly selected from normally distributed populations.

8) Five students took a math test before and after tutoring. Their scores were as follows. 8) _____

Subject	A	B	C	D	E
Before	71	66	67	77	75
After	75	75	65	80	87

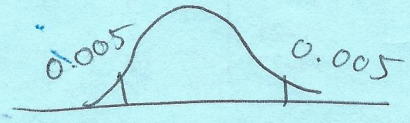
Using a 0.01 level of significance, test the claim that the tutoring has an effect on the math scores.

7

H0: $\mu_d = 0$

H1: $\mu_d \neq 0$ claim $\mu_d < 0$

Test Statistic: -2.134



P-Value: 0.0998 0.0499

Critical Value(s): ± 4.604 (-3.747)

Conclusion on Null Hypothesis: Fail to Reject Ho

Conclusion on Claim: There is not sufficient evidence to support the claim that the tutoring has an effect.

Use critical thinking to determine whether the sampling method appears to be sound or is flawed.

9) "38% of adults in the United States regularly visit a doctor". This conclusion was reached by a college student after she had questioned 520 randomly selected members of her college. What is wrong with her survey? 9) _____

2 Not a good representation of the overall population.
Convenience sample
College students maybe very different than other adults.

Find the indicated probability.

10) The manager of a bank recorded the amount of time each customer spent waiting in line during peak business hours one Monday. The frequency table below summarizes the results. 10) _____

Waiting Time (minutes)	Number of Customers
0–3	9
4–7	10
8–11	12
12–15	4
16–19	4
20–23	2
24–27	2

If we randomly select one of the customers represented in the table, what is the probability that the waiting time is at least 12 minutes?

$\frac{12}{43} = 0.279$

What is the probability that the waiting time is between 8 and 15 minutes?

$\frac{16}{43} = 0.372$

3

What is the probability that the waiting time is at least 12 minutes OR between 8 and 15 mir

$\frac{24}{43} = 0.558$

Use the traditional method to test the given hypothesis. Assume that the samples are independent and that they have been randomly selected

11) In a random sample of 500 people aged 20–24, 22% were smokers. In a random sample of 450 people aged 25–29, 14% were smokers. Test the claim that the proportion of smokers in the two age groups is the same. Use a significance level of 0.01. 11) _____

H0: $p_1 = p_2$ claim

H1: $p_1 \neq p_2$

Test Statistic: 3.19

P-Value: 0.0014 < 0.01

Critical Value(s): ± 2.575 (-2.58)

Conclusion on Null Hypothesis: Reject Ho

Conclusion on Claim: There is sufficient evidence to warrant rejection of the claim that the proportion of smokers in the 2 groups is the same

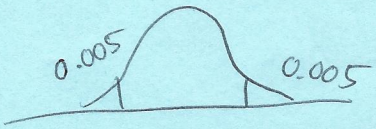
$n_1 = 500$

$x_1 = 0.22 \times 500 = 110$

$n_2 = 450$

$x_2 = 0.14 \times 450 = 63$

7



invNorm(0.005)

Test the indicated claim about the means of two populations. Assume that the two samples are independent simple random samples selected from normally distributed populations. Do not assume that the population standard deviations are equal. Use the traditional method or P-value method as indicated.

12) A researcher was interested in comparing the resting pulse rates of people who exercise regularly and of those who do not exercise regularly. Independent simple random samples of 16 people who do not exercise regularly and 12 people who exercise regularly were selected, and the resting pulse rates (in beats per minute) were recorded. The summary statistics are as follows. 12) _____

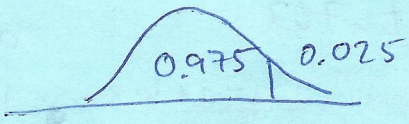
Do not exercise regularly	Exercise regularly
$\bar{x}_1 = 73.0$ beats/min	$\bar{x}_2 = 68.4$ beats/min
$s_1 = 10.9$ beats/min	$s_2 = 8.2$ beats/min
$n_1 = 16$	$n_2 = 12$

df = 11 or df = 26

Use a 0.025 significance level to test the claim that the mean resting pulse rate of people who do not exercise regularly is larger than the mean resting pulse rate of people who exercise regularly.

H0: $\mu_1 = \mu_2$

H1: $\mu_1 > \mu_2$ claim



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Test Statistic: 1.274

P-Value: .1069 > 0.025 invT(0.975)

Critical Value(s): 2.201 or 2.056

Conclusion on Null Hypothesis: Fail to Reject

Conclusion on Claim: There is not sufficient sample evidence to support the claim that the mean resting rate of people who do not exercise regularly is larger than the mean pulse rate of people who exercise regularly.

Find the value of the linear correlation coefficient r.

13) The paired data below consist of the costs of advertising (in thousands of dollars) and the number of products sold (in thousands): 13) _____

Cost	9	2	3	4	2	5	9	10
Number	85	52	55	68	67	86	83	73

Test the claim that there is significant correlation between the cost of advertising and the number of products sold. What is the best predicted number of products sold if the cost of a

H0: $\rho = 0$

H1: $\rho \neq 0$

Test Statistic: $t = 2.454$

P-Value: $0.0495 < 0.05$

Correlation coefficient: 0.708

16 Critical Value(s): $\pm .707$

$a = 55.8 \quad b = 2.8$

Linear Regression Equation: $y = a + bx$ $\quad \hat{y} = 55.8 + 2.8x$

Best predicted number of products sold if cost of advertsing is $7000: 75400

Conclusion on Null Hypothesis: Reject H_0

Conclusion on Claim: The sample data supports that there is significant linear correlation.