Probability and Statistics – Final Exam Review Exercises – Spring 2013

Name_____Period_____

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

Provide an appropriate response.

1) Define the terms population, sample, parameter and statistic. How does a census compare to a sample? 1) _____

2) Define continuous and discrete data and give an example of each. 2) _____

3) Describe a double blind experiment and explain why blinding is used. Define the term "placebo effect" as part of the answer. 3) _____

4) Define the terms "stratified sampling", "systematic sampling", "cluster sampling", and "convenience sampling". Give examples for each. 4) _____

Use common sense to determine whether the given event is impossible; possible, but very unlikely; or possible and likely.

5) Andrew rolled a die five times and got a six every time. 5) _____

6) The ten participants of a seminar on public speaking all showed up on time. 6) _____

Determine whether the given value is a statistic or a parameter.

7) A sample of 120 employees of a company is selected, and the average age is found to be 37 years. 7) _____

Determine whether the given value is from a discrete or continuous data set.

8) The temperature of a cup of coffee is 67.3°F. 8) _____

9) The number of stories in a Manhattan building is 22. 9) _____

Determine which of the four levels of measurement (nominal, ordinal, interval, ratio) is most appropriate.

10) The sample of spheres categorized from softest to hardest. 10) _____

11) Temperatures of the ocean at various depths. 11) _____

12) Amount of fat (in grams) in cookies. 12) _____

Identify the sample and population. Also, determine whether the sample is likely to be representative of the population.

13) 100,000 randomly selected adults were asked whether they drink at least 48 oz of water each day and only 45% said yes. 13) _____

Perform the requested conversions. Round decimals to the nearest thousandth and percents to the nearest tenth of a percent, if necessary.

14) Convert the fraction $\frac{7}{11}$ to an equivalent decimal and percentage. 14) _____

15) Convert 34.4% to an equivalent fraction and decimal. 15) _____

Solve the problem.

16) Alex and Juana went on a 100–mile canoe trip with their class. On the first day they traveled 26 miles. What percent of the total distance did they canoe? 16) _____

17) A lawyer has 40 clients, 10% of whom are businesses. Find the number of business clients. 17) _____

18) On a test, if 80 questions are answered and 76 of them are correct, what is the percent of correct answers? Round to the nearest percent. 18) _____

Provide an appropriate response.

19) An advertisement for a heating pad says that it can reduce back pain by 200%. What is wrong with this statement? 19) _____

Determine whether the given description corresponds to an observational study or an experiment.

20) A clinic gives a drug to a group of ten patients and a placebo to another group of ten patients to find out if the drug has an effect on the patients' illness. 20) _____

21) A political pollster reports that his candidate has a 10% lead in the polls with 10% undecided. 21) _____

Identify which of these types of sampling is used: random, stratified, systematic, cluster, convenience.

22) A sample consists of every 49th student from a group of 496 students. 22) _____

23) An education researcher randomly selects 48 middle schools and interviews all the teachers at each school. 23) _____

24) A researcher interviews 19 work colleagues who work in his building. 24) _____

Provide an appropriate response.

25) A polling company obtains an alphabetical list of names of voters in a precinct. They select every 20th person from the list until a sample of 100 is obtained. They then call these 100 people. Does this sampling plan result in a random sample? Simple random sample? Explain. 25) _____

26) Explain the difference between stratified and cluster sampling. 26) _____

27) A medical research team studied the ages of 34 patients who had strokes caused by stress. The frequency distribution below summarizes the results. When trying to understand the stroke data, what would be the advantage of looking at a histogram instead of this frequency distribution? 27) _____

Age	Frequency
25–29	3
30–34	3
35–39	6
40–44	4
45–49	5
50–54	3
55–59	5
60–64	5

28) One purpose of displaying data graphically is to provide clues about trends. The given values are weights (ounces) of steaks listed on a restaurant menu as "20 ounce porterhouse" steaks. The weights are supposed to be 21 ounces because they supposedly lose an ounce when cooked. Create a frequency distribution with 5 classes. Based on your distribution, comment on the advertised "20 ounce" steaks. 28) _____

17 20 21 18 20 20 20 18 19 19 20 19 21 20 18 20 20 19 18 19

29) The following frequency distribution analyzes the scores on a math test. Find the class boundaries of scores interval 40–59. 29) _____

Scores	Number of students
40–59	2
60–75	4
76–82	6
83–94	15
95–99	5

30) The frequency distribution below summarizes the home sale prices in the city of Summerhill for the month of June. Determine the width of each class. 30) _____

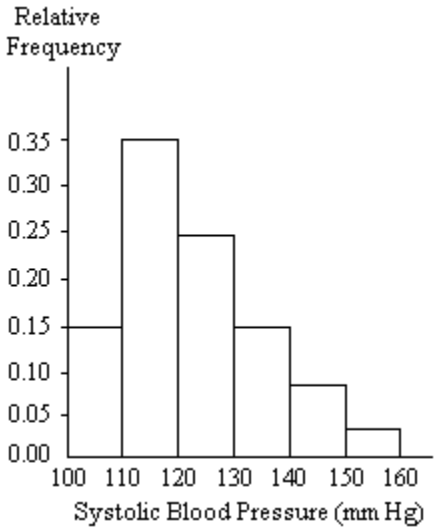
(Sale price in thousand $)	Frequency
80.0 – 110.9	2
111.0 – 141.9	5
142.0 – 172.9	7
173.0 – 203.9	10
204.0 – 234.9	3
235.0 – 265.9	1

31) The frequency distribution for the weekly incomes of students with part–time jobs is given below. 31) _____

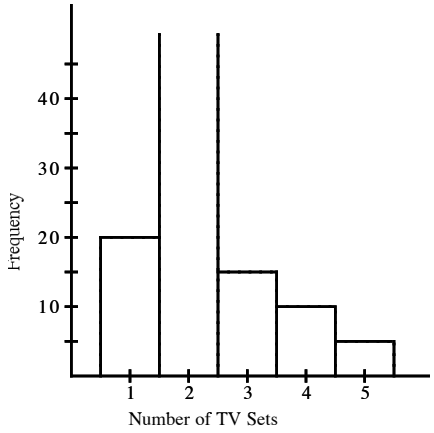
Construct the corresponding relative frequency distribution. Round relative frequencies to the nearest hundredth of a percent if necessary.

Income ($)	Frequency
200–300	60
301–400	73
401–500	91
501–600	89
More than 600	15

32) A nurse measured the blood pressure of each person who visited her clinic. Following is a relative–frequency histogram for the systolic blood pressure readings for those people aged between 25 and 40. The blood pressure readings were given to the nearest whole number. Approximately what percentage of the people aged 25–40 had a systolic blood pressure reading between 110 and 119 inclusive? 32) _____

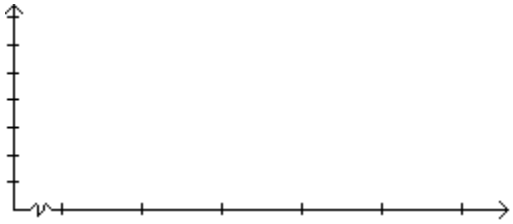


33) The histogram below represents the number of television sets per household for a sample of U.S. households. What is the minimum number of households having the same number of television sets? 33) _____



34) In a survey, 26 voters were asked their ages. The results are shown below. Construct a histogram to represent the data (with 5 classes beginning with a lower class limit of 19.5 and a class width of 10). What is the approximate age at the center? 34) _____

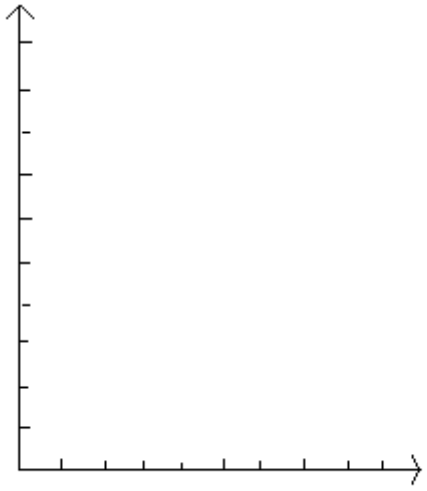
43 56 28 63 67 66 52 48 37 51 40 60 62
66 45 21 35 49 32 53 61 53 69 31 48 59



35) The frequency table below shows the number of days off in a given year for 30 police detectives. 35) _____

Days off	Frequency
0–2	10
3–5	1
6–8	7
9–11	7
12–14	1
15–17	4

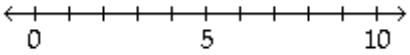
Construct a histogram. Use the class midpoints for the horizontal scale. Does the result appear to be a normal distribution? Why or why not?



Construct the dotplot for the given data.

36) Attendance records at a school show the number of days each student was absent during the year. The days absent for each student were as follows. 36) _____

0 2 3 4 2 3 4 6 7 2 3 4 6 9 8



Use the data to create a stemplot.

37) The attendance counts for this season's basketball games are listed below. 37) _____

227 239 215 219
221 233 229 233
235 228 245 231

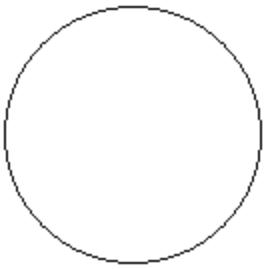
38) The normal monthly precipitation (in inches) for August is listed for 39 different U.S. cities. Construct an expanded stemplot with about 9 rows. 38) _____

3.5 1.6 2.4 3.7 4.1 3.9 1.0 3.6 1.7 0.4 3.2 4.2 4.1
4.2 3.4 3.7 2.2 1.5 4.2 3.4 2.7 4.0 2.0 0.8 3.6 3.7
0.4 3.7 2.0 3.6 3.8 1.2 4.0 3.1 0.5 3.9 0.1 3.5 3.4

Construct a pie chart representing the given data set.

39) The following figures give the distribution of land (in acres) for a county containing 70,000 acres. 39) _____

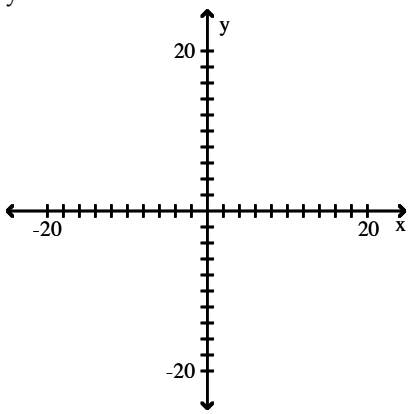
Forest	Farm	Urban
10,500	7000	52,500



Use the given paired data to construct a scatterplot.

40) 40) _____

x	−6	4	7	5	7	6	1	−1	−1
y	3	6	10	8	9	8	6	4	3



Find the mean for the given sample data. Unless indicated otherwise, round your answer to one more decimal place than is present in the original data values.

41) Listed below are the amounts of time (in months) that the employees of a restaurant have been working at the restaurant. Find the mean. 41) _____

1 5 7 8 12 16 18 25 57 90 99 126 136 167

42) The normal monthly precipitation (in inches) for August is listed for 20 different U.S. cities. Find the mean monthly precipitation. 42) _____

3.5 1.6 2.4 3.7 4.1
3.9 1.0 3.6 4.2 3.4
3.7 2.2 1.5 4.2 3.4
2.7 0.4 3.7 2.0 3.6

Find the median for the given sample data.

43) The weights (in ounces) of 21 cookies are shown. Find the median weight. 43) _____

0.71 1.35 0.85 1.62 0.75 0.87 1.00
1.35 1.53 0.99 0.71 1.19 1.47 0.60
0.47 1.19 0.87 1.47 1.72 0.75 0.56

Find the mode(s) for the given sample data.

44) The speeds (in mi/h) of the cars passing a certain checkpoint are measured by radar. The results are shown below. 44) _____

41.3 43.7 44.9 41.8 45.5
45.5 43.7 40.9 47.9 41.8
41.3 40.9 41.8 39.5 43.7
44.3 44.3 44.9 49.7 41.3

Find the mean and median for each of the two samples, then compare the two sets of results.

45) The Body Mass Index (BMI) is measured for a random sample of men from two different colleges. Interpret the results by determining whether there is a difference between the two data sets that is not apparent from a comparison of the measures of center. If there is, what is it? 45) _____

Baxter College	24	23.5	22	27	25	21.5	25	24
Banter College	19	20	24	25	31	18	29	28

Find the range for the given sample data.

46) Listed below are the amounts of weight change (in pounds) for ten women during their first year of work after graduating from college. Positive values correspond to women who gained weight and negative values correspond to women who lost weight. What is the range? 46) _____

3 9 5 12 −1 24 0 −7 7 −1

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

47) Listed below are the amounts of time (in months) that the employees of a restaurant have been working at the restaurant. 47) _____

2 3 5 13 22 35 60 86 101 122

48) The manager of an electrical supply store measured the diameters of the rolls of wire in the inventory. The diameters of the rolls (in meters) are listed below. 48) _____

0.402 0.23 0.569 0.317 0.23 0.543 0.492

Use the empirical rule to solve the problem.

49) At one college, GPA's are normally distributed with a mean of 2.9 and a standard deviation of 0.6. What percentage of students at the college have a GPA between 2.3 and 3.5? 49) _____

Solve the problem. Round results to the nearest hundredth.

50) A department store, on average, has daily sales of $29,876.76. The standard deviation of sales is $1000. On Tuesday, the store sold $34,893.71 worth of goods. Find Tuesday's z score. Was Tuesday an unusually good day? 50) _____

Find the number of standard deviations from the mean. Round your answer to two decimal places.

51) The test scores on the Chapter 3 mathematics test have a mean of 58 and a standard deviation of 11. Andrea scored 85 on the test. How many standard deviations from the mean is that? 51) _____

Find the z–score corresponding to the given value and use the z–score to determine whether the value is unusual. Consider a score to be unusual if its z–score is less than –2.00 or greater than 2.00. Round the z–score to the nearest tenth if necessary.

52) A weight of 110 pounds among a population having a mean weight of 164 pounds and a standard deviation of 25.6 pounds. 52) _____

Determine which score corresponds to the higher relative position.

53) Which score has the highest relative position: a score of 32 on a test for which $\bar{x} = 26$ and $s = 10$, a score of 5.7 on a test for which $\bar{x} = 4.7$ and $s = 1.3$ or a score of 394.5 on a test for which $\bar{x} = 374$ and $s = 41$? 53) _____

Find the percentile for the data value.

54) Data set: 122 134 126 120 128 130 120 118 125 122 126 136 118 122 124 119; data value: 128 54) _____

Find the indicated measure.

55) The weights (in pounds) of 30 newborn babies are listed below. Find Q_1. 55) _____

5.5 5.7 5.8 6.0 6.1 6.1 6.3 6.4 6.5 6.6
6.7 6.7 6.7 6.9 7.0 7.0 7.0 7.1 7.2 7.2
7.4 7.5 7.7 7.7 7.8 8.0 8.1 8.1 8.3 8.7

Construct a boxplot for the given data. Include values of the 5–number summary in all boxplots.

56) The highest temperatures ever recorded (in °F) in 32 different U.S. states are shown below. Construct a boxplot for the data set. 56) _____

100 100 105 105 106 106 107 107
109 110 110 112 112 112 114 114
114 115 116 117 118 118 118 118
118 119 120 121 122 125 128 134

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Answer the question.

57) Which of the following cannot be a probability? 57) _____

A) $\frac{1}{2}$ B) $\frac{5}{3}$ C) $\frac{3}{5}$ D) $\frac{2}{3}$

Answer the question, considering an event to be "unusual" if its probability is less than or equal to 0.05.

58) If you drew one card from a standard deck, would it be "unusual" to draw a 4? 58) _____

A) Yes B) No

59) Assume that one student in your class of 31 students is randomly selected to win a prize. Would it be "unusual" for you to win? 59) _____

A) Yes B) No

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

Answer the question.

60) In a certain town, 25% of people commute to work by bicycle. If a person is selected randomly from the town, what are the odds against selecting someone who commutes by bicycle? 60) _____

Determine whether the events are disjoint.

61) Find a ten dollar bill on the sidewalk.
Find a ten dollar bill on the grass. 61) _____

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Find the indicated complement.

62) The probability that Luis will pass his statistics test is 0.90. Find the probability that he will fail his statistics test. 62) _____

A) 9.00 B) 1.11 C) 0.45 D) 0.10

Find the indicated probability.

63) If you pick a card at random from a well shuffled deck, what is the probability that you get a face card or a spade? 63) _____

A) $\frac{9}{26}$ B) $\frac{25}{52}$ C) $\frac{1}{22}$ D) $\frac{11}{26}$

64) 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. 64) _____

Waiting Time (minutes)	Number of Customers
0–3	11
4–7	9
8–11	11
12–15	5
16–19	5
20–23	1
24–27	3

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 or between 8 and 15 minutes?

A) 0.727 B) 0.556 C) 0.111 D) 0.667

65) A bag contains 5 red marbles, 3 blue marbles, and 1 green marble. Find P(not blue). 65) _____

A) $\frac{2}{3}$ B) $\frac{3}{2}$ C) 6 D) $\frac{1}{3}$

Is Event B dependent or independent of Event A?

66) A: A bird lands on your head. 66) _____
B: The bird lays an egg.

A) Independent B) Dependent

Find the indicated probability.

67) Find the probability of correctly answering the first 5 questions on a multiple choice test if random guesses are made and each question has 6 possible answers. 67) _____

A) $\frac{1}{15625}$ B) $\frac{1}{7776}$ C) $\frac{5}{6}$ D) $\frac{6}{5}$

68) A batch consists of 12 defective coils and 88 good ones. Find the probability of getting two good coils when two coils are randomly selected if the first selection is replaced before the second is made. 68) _____

A) 0.0144 B) 0.7733 C) 0.176 D) 0.7744

69) Find the probability that 3 randomly selected people all have the same birthday. Ignore leap years. Round to eight decimal places. 69) _____

A) 0.00000002 B) 0.3333 C) 0.00000751 D) 0.0082

70) What is the probability that 4 randomly selected people all have different birthdays? Round to four decimal places. 70) _____

A) 0.9891 B) 0.9918 C) 0.9729 D) 0.9836

71) The table below describes the smoking habits of a group of asthma sufferers. 71) _____

	Nonsmoker	Light smoker	Heavy smoker	Total
Men	305	42	31	378
Women	442	34	30	506
Total	747	76	61	884

If two different people are randomly selected from the 884 subjects, find the probability that they are both women. Round to four decimal places.

A) 0.2500 B) 0.3276 C) 0.000003906 D) 0.3274

Provide a written description of the complement of the given event.

72) When 100 engines are shipped, all of them are free of defects. 72) _____

A) At least one of the engines is defective. B) At most one of the engines is defective.
C) All of the engines are defective. D) None of the engines are defective.

73) Of the thirteen different women Calvin asks for a date, at least one of them accepts. 73) _____

A) All but one woman accepts Calvin's offer.
B) At most one of the women accepts Calvin's offer.
C) None of the women accept Calvin's offer.
D) All of the women accept Calvin's offer.

Find the indicated probability. Round to the nearest thousandth.

74) A sample of 4 different calculators is randomly selected from a group containing 16 that are defective and 30 that have no defects. What is the probability that at least one of the calculators is defective? 74) _____

A) 0.819 B) 0.832 C) 0.160 D) 0.168

Find the indicated probability. Express your answer as a simplified fraction unless otherwise noted.

75) The table below shows the soft drinks preferences of people in three age groups. 75) _____

	cola	root beer	lemon–lime
under 21 years of age	40	25	20
between 21 and 40	35	20	30
over 40 years of age	20	30	35

If one of the 255 subjects is randomly selected, find the probability that the person is over 40 years of age.

A) $\frac{1}{2}$ B) $\frac{1}{3}$ C) $\frac{3}{5}$ D) $\frac{2}{5}$

76) The following table contains data from a study of two airlines which fly to Small Town, USA. 76) _____

	Number of flights which were on time	Number of flights which were late
Podunk Airlines	33	6
Upstate Airlines	43	5

If one of the 87 flights is randomly selected, find the probability that the flight selected is an Upstate Airlines flight given that it was late.

A) $\frac{5}{11}$ B) $\frac{5}{87}$

C) $\frac{5}{48}$ D) None of the above is correct.

Evaluate the expression.

77) ${}_6P_5$ 77) _____

A) 0 B) 21 C) 1 D) 720

78) ${}_{11}C_4$ 78) _____

A) 3 B) 330 C) 1980 D) 5040

Solve the problem.

79) How many ways can an IRS auditor select 5 of 10 tax returns for an audit? 79) _____

A) 252 B) 100,000 C) 30,240 D) 120

80) A musician plans to perform 5 selections. In how many ways can she arrange the musical selections? 80) _____

A) 5 B) 25 C) 120 D) 720

Answer the question.

81) 12 wrestlers compete in a competition. If each wrestler wrestles one match with each other wrestler, what are the total numbers of matches? 81) _____

A) 66 B) 156 C) 78 D) 132

Find the mean of the given probability distribution.

82) 82) _____

x	P(x)
0	0.42
1	0.12
2	0.34
3	0.05
4	0.07

A) $\mu = 1.13$ B) $\mu = 1.65$ C) $\mu = 1.55$ D) $\mu = 1.23$

Provide an appropriate response.

83) A contractor is considering a sale that promises a profit of $33,000 with a probability of 0.7 or a loss (due to bad weather, strikes, and such) of $16,000 with a probability of 0.3. What is the expected profit? 83) _____

A) $23,100 B) $18,300 C) $34,300 D) $17,000

84) A 28–year–old man pays $165 for a one–year life insurance policy with coverage of $140,000. If the probability that he will live through the year is 0.9994, what is the expected value for the insurance policy? 84) _____

A) $139,916.00 B) –$164.90 C) –$81.00 D) $84.00

Assume that a procedure yields a binomial distribution with a trial repeated n times. Use the binomial probability formula to find the probability of x successes given the probability p of success on a single trial. Round to three decimal places.

85) $n = 64$, $x = 3$, $p = 0.04$ 85) _____

A) 0.139 B) 0.091 C) 0.221 D) 0.375

Find the indicated probability.

86) The brand name of a certain chain of coffee shops has a 58% recognition rate in the town of Coffleton. An executive from the company wants to verify the recognition rate as the company is interested in opening a coffee shop in the town. He selects a random sample of 9 Coffleton residents. Find the probability that the number that recognize the brand name is not 4. 86) _____

A) 0.814 B) 0.0900 C) 0.00148 D) 0.186

Find the mean, μ, for the binomial distribution which has the stated values of n and p. Round answer to the nearest tenth.

87) $n = 2772$; $p = 0.63$ 87) _____

A) $\mu = 1746.4$ B) $\mu = 1737.9$ C) $\mu = 1741.1$ D) $\mu = 1750.1$

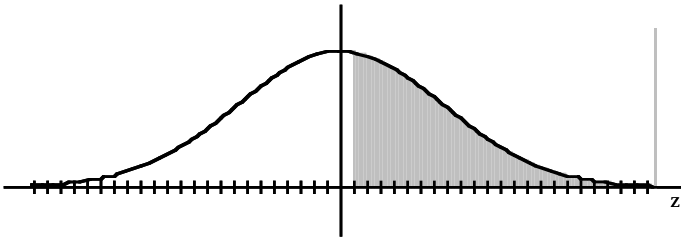
Find the standard deviation, σ, for the binomial distribution which has the stated values of n and p. Round your answer to the nearest hundredth.

88) $n = 639$; $p = 0.7$ 88) _____

A) $\sigma = 11.58$ B) $\sigma = 9.17$ C) $\sigma = 15.70$ D) $\sigma = 14.85$

Find the indicated z score. The graph depicts the standard normal distribution with mean 0 and standard deviation 1.

89) Shaded area is 0.4483. 89) _____



A) 0.3264 B) 0.6736 C) 0.13 D) –0.13

If z is a standard normal variable, find the probability.

90) The probability that z lies between –1.10 and –0.36 90) _____

A) 0.4951 B) 0.2237 C) 0.2239 D) –0.2237

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

91) In one region, the September energy consumption levels for single–family homes are found to be normally distributed with a mean of 1050 kWh and a standard deviation of 218 kWh. Find P_{45}, which is the consumption level separating the bottom 45% from the top 55%. 91) _____

A) 1021.7 B) 1087.8 C) 1148.1 D) 1078.3

Use the given degree of confidence and sample data to construct a confidence interval for the population proportion p.

92) $n = 125$, $x = 72$; 90% confidence 92) _____

A) $0.503 < p < 0.649$ B) $0.507 < p < 0.645$

C) $0.506 < p < 0.646$ D) $0.502 < p < 0.650$

Solve the problem. Round the point estimate to the nearest thousandth.

93) Find the point estimate of the proportion of people who wear hearing aids if, in a random sample of 304 people, 20 people had hearing aids. 93) _____

A) 0.062 B) 0.063 C) 0.066 D) 0.934

Use the given degree of confidence and sample data to construct a confidence interval for the population proportion p.

94) Of 346 items tested, 12 are found to be defective. Construct the 98% confidence interval for the proportion of all such items that are defective. 94) _____

A) $0.0154 < p < 0.0540$ B) $0.0118 < p < 0.0576$

C) $0.0345 < p < 0.0349$ D) $0.0110 < p < 0.0584$

Solve the problem.

95) A newspaper article about the results of a poll states: "In theory, the results of such a poll, in 99 cases out of 100 should differ by no more than 5 percentage points in either direction from what would have been obtained by interviewing all voters in the United States." Find the sample size suggested by this statement. 95) _____

A) 385 B) 664 C) 544 D) 27

Use the confidence level and sample data to find the margin of error E. Round your answer to the same number of decimal places as the sample mean unless otherwise noted.

96) Replacement times for washing machines: 90% confidence; $n = 45$, $\bar{x} = 11.9$ years, $\sigma = 2.0$ years 96) _____

A) 0.5 yr B) 2.9 yr C) 0.1 yr D) 0.4 yr

Use the confidence level and sample data to find a confidence interval for estimating the population μ. Round your answer to the same number of decimal places as the sample mean.

97) Test scores: $n = 75$, $\bar{x} = 46.1$, $\sigma = 5.8$; 98% confidence 97) _____

A) $44.8 < \mu < 47.4$ B) $44.5 < \mu < 47.7$ C) $45.0 < \mu < 47.2$ D) $44.4 < \mu < 47.8$

Use the given information to find the minimum sample size required to estimate an unknown population mean μ.

98) Margin of error: \$137, confidence level: 99%, $\sigma = \$591$ 98) _____

A) 71 B) 63 C) 50 D) 124

99) How many weeks of data must be randomly sampled to estimate the mean weekly sales of a new line of athletic footwear? We want 99% confidence that the sample mean is within \$200 of the population mean, and the population standard deviation is known to be \$1100. 99) _____

A) 82 B) 117 C) 165 D) 201

Assume that a sample is used to estimate a population mean μ. Use the given confidence level and sample data to find the margin of error. Assume that the sample is a simple random sample and the population has a normal distribution. Round your answer to one more decimal place than the sample standard deviation.

100) 95% confidence; $n = 91$; $\bar{x} = 16$, $s = 9.1$ 100) _____

A) 1.90 B) 1.63 C) 1.71 D) 4.10

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

Identify the null hypothesis, alternative hypothesis, test statistic, P–value, conclusion about the null hypothesis, and final conclusion that addresses the original claim.

101) An article in a journal reports that 34% of American fathers take no responsibility for child care. A researcher claims that the figure is higher for fathers in the town of Littleton. A random sample of 234 fathers from Littleton yielded 96 who did not help with child care. Test the researcher's claim at the 0.05 significance level. 101) _____

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Find the P–value for the indicated hypothesis test.

102) In a sample of 88 children selected randomly from one town, it is found that 8 of them suffer from asthma. Find the P–value for a test of the claim that the proportion of all children in the town who suffer from asthma is equal to 11%. 102) _____

A) 0.2157 B) 0.5686 C) 0.2843 D) –0.2843

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

Assume that a simple random sample has been selected from a normally distributed population and test the given claim. Use either the traditional method or P–value method as indicated. Identify the null and alternative hypotheses, test statistic, critical value(s) or P–value (or range of P–values) as appropriate, and state the final conclusion that addresses the original claim.

103) A manufacturer makes ball bearings that are supposed to have a mean weight of 30 g. A retailer suspects that the mean weight is actually less than 30 g. The mean weight for a random sample of 16 ball bearings is 28.4 g with a standard deviation of 4.5 g. At the 0.05 significance level, test the claim that the sample comes from a population with a mean weight less than 30 g. Use the traditional method of testing hypotheses. 103) _____

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

104) In a random sample of 360 women, 65% favored stricter gun control laws. In a random sample of 220 men, 60% favored stricter gun control laws. Test the claim that the proportion of women favoring stricter gun control is higher than the proportion of men favoring stricter gun control. Use a significance level of 0.05. 104) _____

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Construct the indicated confidence interval for the difference between population proportions $p_1 - p_2$. Assume that the samples are independent and that they have been randomly selected.

105) 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. Construct a 95% confidence interval for the difference between the population proportions $p_1 - p_2$. 105) _____

A) $0.032 < p_1 - p_2 < 0.128$ B) $0.025 < p_1 - p_2 < 0.135$

C) $0.035 < p_1 - p_2 < 0.125$ D) $0.048 < p_1 - p_2 < 0.112$

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

Solve the problem.

106) To test the null hypothesis that the difference between two population proportions is equal to a nonzero constant c, use the test statistic 106) _____

$$z = \frac{(\hat{p}_1 - \hat{p}_2) - c}{\sqrt{\hat{p}_1 (1 - \hat{p}_1)/n_1 + \hat{p}_2 (1 - \hat{p}_2)/n_2}}$$

As long as n_1 and n_2 are both large, the sampling distribution of the test statistic z will be approximately the standard normal distribution. Given the sample data below, test the claim that the proportion of male voters who plan to vote Republican at the next presidential election is 15 percentage points more than the percentage of female voters who plan to vote Republican. Use the P–value method of hypothesis testing and use a significance level of 0.10.

Men: $n_1 = 250$, $x_1 = 146$

Women: $n_2 = 202$, $x_2 = 103$

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.

107) A researcher wishes to determine whether people with high blood pressure can reduce their blood pressure, measured in mm Hg, by following a particular diet. Use a significance level of 0.01 to test the claim that the treatment group is from a population with a smaller mean than the control group. Use the traditional method of hypothesis testing. 107) _____

Treatment Group	Control Group
$n_1 = 35$	$n_2 = 28$
$\bar{x}1 = 189.1$	$\bar{x}2 = 203.7$
$s_1 = 38.7$	$s_2 = 39.2$

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Construct the indicated confidence interval for the difference between the two population means. 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.

108) Two types of flares are tested and their burning times are recorded. The summary statistics are given below. 108) _____

Brand X	Brand Y
$n = 35$	$n = 40$
$\bar{x} = 19.4$ min	$\bar{x} = 15.1$ min
$s = 1.4$ min	$s = 0.8$ min

Construct a 95% confidence interval for the differences between the mean burning time of the brand X flare and the mean burning time of the brand Y flare.

A) $3.8 \text{ min} < \mu_X - \mu_Y < 4.8 \text{ min}$ B) $3.5 \text{ min} < \mu_X - \mu_Y < 5.1 \text{ min}$

C) $3.2 \text{ min} < \mu_X - \mu_Y < 5.4 \text{ min}$ D) $3.6 \text{ min} < \mu_X - \mu_Y < 5.0 \text{ min}$

Use the model to make the appropriate prediction.

109) A random sample of records of electricity usage of homes in the month of July gives the amount of electricity used and size (in square feet) of 135 homes. A regression was done to predict the amount of electricity used (in kilowatt–hours) from size. The residuals plot indicated that a linear model is appropriate. The model is $\hat{usage} = 1204 + 0.6$ size. How much electricity would you predict would be used in a house that is 2273 square feet? 109) _____

A) 1781.67 kilowatt–hours
B) 2567.8 kilowatt–hours
C) 3477.6 kilowatt–hours
D) 1363.8 kilowatt–hours
E) 159.8 kilowatt–hours

Fill in the missing information.

110)

$\bar{x}$	s_x	$\bar{y}$	s_y	r	$\hat{y} = b_0 + b_1 x$
13	2	21	3	0.5	$\hat{y} = ?$

110) _____

A) $\hat{y} = 16.67 + 0.33x$
B) $\hat{y} = 0.75 + 11.25x$
C) $\hat{y} = 1.5 + 1.5x$
D) $\hat{y} = 1.5 + 1.62x$
E) $\hat{y} = 11.25 + 0.75x$