Practice Final Exam Math 115 Name_____

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

1) An employee at the local ice cream parlor asks three customers if they like chocolate ice cream. Identify the sample and population. 1) _____

A) Sample: the 3 selected customers; population: the customers who like chocolate ice cream
B) Sample: the customers who like chocolate ice cream; population: all customers
C) Sample: the 3 selected customers; population: all customers
D) Sample: all customers; population: the 3 selected customers

Provide an appropriate response.

2) The table below shows the average income by age group for the residents of one town in the year 1998. The average incomes for each age group are estimates based on a sample of size 100 from each group. 2) _____

Age group	Average income
18–24	$17,180
25–39	$26,661
40–54	$32,471
55–70	$25,960
Over 70	$18,241

Classify the study as either descriptive or inferential.

A) Descriptive B) Inferential

Classify the data as either qualitative or quantitative.

3) The following table gives the top five movies at the box office this week. 3) _____

Rank	Last week	Movie title	Studio	Box office sales ($ millions)
1	N/A	Pirate Adventure	Movie Giant	35.2
2	2	Secret Agent Files	G.M.G.	19.5
3	1	Epic Super Hero Team	21st Century	14.3
4	5	Reptile Ride	Movie Giant	10.1
5	4	Must Love Cats	Dreamboat	9.9

What kind of data is provided by the information in the second column?

A) Qualitative B) Quantitative

Classify the data as either discrete or continuous.

4) An athlete runs 100 meters in 10.7 seconds. 4) _____

A) Discrete B) Continuous

5) Last year, nine employees of an electronics company retired. Their ages at retirement are listed below. Find the mean retirement age. 5) _____

53 67 68
50 62 58
63 52 57

A) 58.0 yr B) 58.9 yr C) 57.6 yr D) 58.2 yr

6) The following table shows the heights of the five tallest mountains in North America. 6) _____

Mountain	Height (ft)	Rank
McKinley	20,320	1
Logan	19,850	2
Citlaltepec	18,700	3
St. Elias	18,008	4
Popocatepetl	17,930	5

What kind of data is given in the third column of the table?

A) Discrete B) Continuous

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

7) 20, 40, 46, 40, 49, 40, 49 7) _____

A) 40 B) 40.6 C) 46 D) 49

8) The distances traveled (in miles) to 7 different swim meets are given below: 8) _____
16, 25, 39, 42, 69, 73, 81 Find the median of the given data.

A) 49 miles B) 42 miles C) 39 miles D) 69 miles

9) The manager of a small dry cleaner employs six people. As part of their personnel file, she asked each one to record to the nearest one–tenth of a mile the distance they travel one way from home to work. The six distances are listed below. Find the sample standard deviation. 9) _____

22.7 10.3 42.5 27.9 23.4 16.2

A) 35.20 mi B) 11.03 mi C) 3408.17 mi D) 4016.04 mi

Obtain the five–number summary for the given data.

10) The test scores of 15 students are listed below. 10) _____

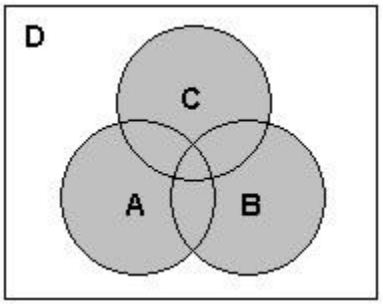
40 47 50 53 57
63 67 71 72 76
85 87 90 94 95

A) 40, 53, 71.5, 87, 95 B) 40, 52.25, 71, 85.5, 95
C) 40, 55, 71, 86, 95 D) 40, 52.25, 71.5, 85.5, 95

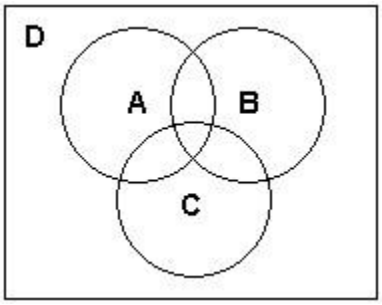
Draw a Venn diagram and shade the described events.

11) From a finite sample, events A, B, and C are non–mutually exclusive. Shade the collection A and B and C. 11) _____

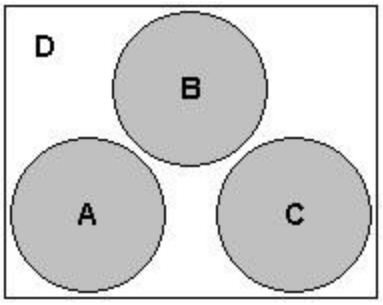
A)



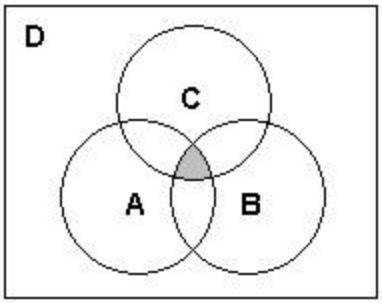
B)



C)



D)



Find the indicated probability by using the special addition rule.

12) A card is drawn from a well–shuffled deck of 52 cards. What is the probability of drawing a face card or a 3? 12) _____

A) $\frac{4}{13}$ B) 16 C) $\frac{48}{52}$ D) $\frac{2}{13}$

Find the indicated probability by using the complementation rule.

13) A percentage distribution is given below for the size of families in one U.S. city. 13) _____

Size	Percentage
2	47.1
3	21.0
4	19.1
5	8.0
6	3.0
7+	1.8

A family is selected at random. Find the probability that the size of the family is less than 6. Round results to three decimal places.

A) 0.952 B) 0.048 C) 0.982 D) 0.030

14) The probability that Luis will pass his statistics test is 0.89. Find the probability that he will fail his statistics test. 14) _____

A) 0.11 B) 1.12 C) 0.45 D) 8.09

Find the conditional probability.

15) Suppose one card is selected at random from an ordinary deck of 52 playing cards. Let 15) _____

A = event a queen is selected
B = event a diamond is selected.

Determine P(B | A).

A) 0.019 B) 0.25 C) 0.077 D) 0.308

Use the general multiplication rule to find the indicated probability.

16) You are dealt two cards successively (without replacement) from a shuffled deck of 52 playing cards. Find the probability that the first card is a king and the second card is a queen. 16) _____

A) 0.002 B) 0.127 C) 0.006 D) 0.154

Find the specified probability.

17) The number of loaves of rye bread left on the shelf of a local bakery at closing (denoted by the random variable X) varies from day to day. Past records show that the probability distribution of X is as shown in the following table. Find the probability that there will be at least three loaves left over at the end of any given day. 17) _____

x	0	1	2	3	4	5	6
P(X = x)	0.20	0.25	0.20	0.15	0.10	0.08	0.02

A) 0.15 B) 0.20 C) 0.35 D) 0.65

Calculate the specified probability

18) Suppose that W is a random variable. Given that P(W ≤ 2) = 0.425, find P(W > 2). 18) _____

A) 2 B) 0.425 C) 0.575 D) 0

Find the indicated binomial probability.

19) What is the probability that 6 rolls of a fair die will show four exactly 5 times? 19) _____

A) 0.00011 B) 0.00064 C) 0.00077 D) 0.33490

Use a table of areas to find the specified area under the standard normal curve.

20) The area that lies to the right of 0.59 20) _____

A) 0.2190 B) 0.7224 C) 0.2776 D) 0.2224

Find the indicated binomial probability.

21) A multiple choice test has 30 questions, and each has four possible answers, of which one is correct. If a student guesses on every question, find the probability of getting exactly 9 correct. 21) _____

A) 54.57745 B) 0 C) 0.12981 D) 47,104.5406

Use a table of areas for the standard normal curve to find the required z–score.

22) Find the z–score for which the area under the standard normal curve to its left is 0.96 22) _____

A) 1.82 B) 1.03 C) 1.75 D) –1.38

Find the indicated probability or percentage for the normally distributed variable.

23) The incomes of trainees at a local mill are normally distributed with a mean of $1,100 and a standard deviation $150. What percentage of trainees earn less than $900 a month? 23) _____

A) 90.82% B) 9.18% C) 35.31% D) 40.82%

Find the requested probability.

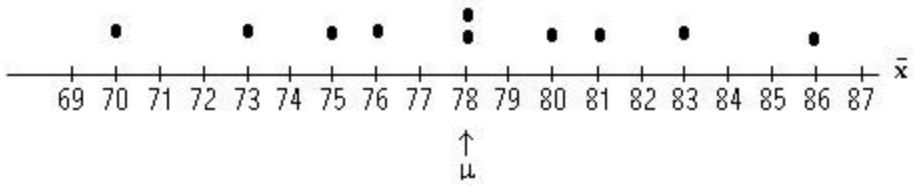
24) The table reports the distribution of pocket money, in bills, of the 6 students in a statistics seminar. 24) _____

Student	Hannah	Ming	Keshaun	Tameeka	Jose	Vaishali
Amount, in dollars	2	4	4	5	5	7

For a random sample of size two, find the probability, expressed as a percent rounded to the nearest tenth, that the sample mean will be within $1 of the population mean.

A) 66.7% B) 80.0% C) 73.3% D) 78.6%

25) The test scores of 5 students are under consideration. The following is the dotplot for the sampling distribution of the sample mean for samples of size 2. 25) _____



Find the probability, expressed as a percent, that the sample mean will be equal to the population mean.

A) 10% B) 5% C) 30% D) 20%

For samples of the specified size from the population described, find the mean and standard deviation of the sample mean $\bar{x}$.

26) The mean and the standard deviation of the sampled population are, respectively, 182.1 and 29.4. n = 36. Find the mean and standard deviation of the sample mean. 26) _____

A) $\mu_{\bar{x}} = 29.4$; $\sigma_{\bar{x}} = 4.9$

B) $\mu_{\bar{x}} = 356.9$; $\sigma_{\bar{x}} = 1.0$

C) $\mu_{\bar{x}} = 182.1$; $\sigma_{\bar{x}} = 4.9$

D) $\mu_{\bar{x}} = 4.9$; $\sigma_{\bar{x}} = 182.1$

Identify the distribution of the sample mean. In particular, state whether the distribution of $\bar{x}$ is normal or approximately normal and give its mean and standard deviation.

27) The weights of people in a certain population are normally distributed with a mean of $157\,\text{lb}$ and a standard deviation of $21\,\text{lb}$. Determine the sampling distribution of the mean for samples of size 8. 27) _____

A) Approximately normal, mean = 157 lb, standard deviation = 7.42 lb
B) Normal, mean = 157 lb, standard deviation = 21 lb
C) Approximately normal, mean = 157 lb, standard deviation = 2.63 lb
D) Normal, mean = 157 lb, standard deviation = 7.42 lb

Provide an appropriate response.

28) Find the value of α that corresponds to a confidence level of 96.6% 28) _____

A) 0.034 B) 0.34 C) 3.4 D) 0.966

Find the confidence interval specified.

29) The mean score, $\bar{x}$, on an aptitude test for a random sample of 9 students was 64. Assuming that $\sigma = 16$, construct a 95.44% confidence interval for the mean score, μ, of all students taking the test. 29) _____

A) 32 to 96 B) 56.0 to 72.0 C) 53.3 to 74.7 D) 60.4 to 67.6

30) A random sample of 108 light bulbs had a mean life of $\bar{x} = 479$ hours. Assume that $\sigma = 23$ hours Construct a 90% confidence interval for the mean life, μ, of all light bulbs of this type. 30) _____

A) 474.7 to 483.3 hours B) 473.8 to 484.2 hours
C) 475.3 to 482.7 hours D) 473.3 to 484.7 hours

Solve the problem.

31) A sample of 33 washing machines yields a mean replacement time of 10.0 years. Assuming that $\sigma = 2.0$ years, find the margin of error in estimating μ at the 90% level of confidence. 31) _____

A) 0.4 years B) 2.9 years C) 0.1 years D) 0.6 years

Find the confidence interval specified.

32) The mean score, $\bar{x}$, on an aptitude test for a random sample of 8 students was 64. Assuming that $\sigma = 15$, construct a 95.44% confidence interval for the mean score, μ, of all students taking the test. 32) _____

A) 56.0 to 72.0 B) 53.4 to 74.6 C) 60.2 to 67.8 D) 34 to 94

Provide an appropriate response.

33) A confidence interval for a population mean has a margin of error of 2.8. If the sample mean is 68.9, obtain the confidence interval. 33) _____

A) From 67.5 to 70.3 B) From 68.9 to 71.7
C) From 66.1 to 68.9 D) From 66.1 to 71.7

Find the confidence interval specified.

34) 32 packages are randomly selected from packages received by a parcel service. The sample has a mean weight of 27.8 pounds. Assume that $\sigma = 2.4$ pounds. What is the 95% confidence interval for the true mean weight, μ, of all packages received by the parcel service? 34) _____

A) 27.1 to 28.5 pounds B) 26.7 to 28.9 pounds
C) 26.8 to 28.8 pounds D) 27.0 to 28.6 pounds

A hypothesis test is to be performed for a population mean with null hypothesis $H_0 : \mu = \mu_0$. The test statistic used will be $z = \dfrac{\bar{x} - \mu_0}{\sigma/\sqrt{n}}$. Find the required critical value(s).

35) A two–tailed test with $\alpha = 0.05$. 35) _____

A) ±1.764 B) ±2.575 C) ±1.96 D) ±1.645

Find the confidence interval specified. Assume that the population is normally distributed.

36) Thirty randomly selected students took the calculus final. If the sample mean was 90 and the sample standard deviation was 13.9, construct a 99% confidence interval for the mean score of all students. 36) _____

A) 83.01 to 96.99 B) 83.03 to 96.97 C) 85.69 to 94.31 D) 83.75 to 96.25

A sample mean, sample size, and population standard deviation are given. Use the one–mean z–test to perform the required hypothesis test about the mean, μ, of the population from which the sample was drawn.

37) $\bar{x}$ = 54, n = 36, σ = 5.6, H_0: μ = 56; H_a: μ < 56, α = 0.05 37) _____

A) Reject H_0 if z < –1.645; z = –2.14; therefore reject H_0 and conclude that $\mu < 56$.

B) Reject H_0 if z > –1.645; z = –2.14; therefore do not reject H_0 The data do not provide sufficient evidence to support H_a: μ < 56.

C) Reject H_0 if z < –1.645; z = –0.36; therefore do not reject H_0. The data do not provide sufficient evidence to support H_a: μ < 56.

D) Reject H_0 if z < –1.96; z = –2.14; therefore reject H_0 and conclude that $\mu < 56$.

38) $\bar{x}$ = 7.3, n = 18 , σ = 1.9, H_0: μ = 10; H_a: μ < 10, α = 0.01 38) _____

A) Reject H_0 if z > 1.96; z = –6.03; therefore do not reject H_0. The data do not provide sufficient evidence to support H_a: μ < 10.

B) Reject H_0 if z > –2.33; z = –6.03; therefore do not reject H_0. The data do not provide sufficient evidence to support H_a: μ < 10.

C) Reject H_0 if z < –1.96; z = –6.03; therefore reject H_0 and conclude that $\mu < 10$.

D) Reject H_0 if z < –2.33; z = –6.03; therefore reject H_0 and conclude that $\mu < 10$.

For the given hypothesis test, explain the meaning of a Type I error, a Type II error, or a correct decision as specified.

39) In the past, the mean running time for a certain type of flashlight battery has been 8.9 hours The manufacturer has introduced a change in the production method and wants to perform a hypothesis test to determine whether the mean running time has increased as a result. The hypotheses are: 39) _____

H_0 : μ = 8.9 hours

H_a : μ > 8.9 hours

where μ is the mean running time of the new batteries . Explain the meaning of a Type I error.

A) A Type I error would occur if, in fact, μ > 8.9 hours, but the results of the sampling lead to the conclusion that μ < 8.9 hours.

B) A Type I error would occur if, in fact, μ = 8.9 hours, but the results of the sampling do not lead to rejection of that fact.

C) A Type I error would occur if, in fact, μ = 8.9 hours, but the results of the sampling lead to the conclusion that μ > 8.9 hours.

D) A Type I error would occur if, in fact, μ > 8.9 hours, but the results of the sampling fail to lead to that conclusion.

Find the value of the chi–square test statistic for the goodness–of–fit test.

40) According to recent research, the distribution of the number of children per family in the U.S. is as follows. 40) _____

Number of children	Percent
More than 3	20.3
3	21.3
2	14.5
1	16.1
0	27.8

A random sample of 700 families with both parents under 40 yielded the following data.

Number of children	Number of families
More than 3	154
3	196
2	46
1	101
0	203

You wish to test the claim that the distribution of the number of children per family for families with both parents under 40 is the same as that of the U.S. as a whole. What is the value of the χ^2 test statistic? Note that the expected frequencies are as follows: more than 3 children: 142.1 3 children: 149.1 2 children: 101.5 one child: 112.7 0 children: 194.6

A) $\chi^2 = 13.781$ B) $\chi^2 = 47.674$ C) $\chi^2 = 80.807$ D) $\chi^2 = 32.091$

41) You wish to test the claim that a die is fair. You roll it 48 times with the following results. 41) _____

Number	1	2	3	4	5	6
Frequency	5	10	12	9	4	8

What is the value of the χ^2 test statistic? The observed frequencies and the expected frequencies are shown below.

Observed frequency (O)	Expected frequency (E)
5	8
10	8
12	8
9	8
4	8
8	8

A) $\chi^2 = 7.667$ B) $\chi^2 = 4.182$ C) $\chi^2 = 5.75$ D) $\chi^2 = 3.538$

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question. Perform a chi–square independence test using the critical value approach, provided the conditions for using the test are met. Be sure to state the hypotheses and the significance level, to obtain the expected frequencies, to obtain the critical value, to compute the value of the test statistic, and to state your conclusion.

42) A researcher performed a study to determine whether an association exists between sex and blood type. He obtained the following sample data. 42) _____

		Blood Type				
		O	A	B	AB	Total
Sex	Female	157	143	40	20	360
	Male	143	127	35	15	320
	Total	300	270	75	35	680

At the 5% significance level, do the data provide sufficient evidence to conclude that an association exists between sex and blood type?

43) A researcher performed a study to determine whether an association exists between political party affiliation and income. She obtained the following sample data. 43) _____

		Income Bracket			
		Low	Middle	High	Total
Party	Democrat	101	130	97	328
	Republican	78	113	146	337
	Other	15	34	9	58
	Total	194	277	252	723

At the 10% significance level, do the data provide sufficient evidence to conclude that an association exists between political party affiliation and income?

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question. Determine the regression equation for the data. Round the final values to three significant digits, if necessary.

44) $\begin{array}{c|cccc} x & 2 & 4 & 5 & 6 \\ \hline y & 7 & 11 & 13 & 20 \end{array}$ 44) _____

A) $\hat{y} = 3x$ B) $\hat{y} = 0.15 + 3x$ C) $\hat{y} = 2.8x$ D) $\hat{y} = 0.15 + 2.8x$

45) $\begin{array}{c|ccccc} x & 6 & 8 & 20 & 28 & 36 \\ \hline y & 2 & 4 & 13 & 20 & 30 \end{array}$ 45) _____

A) $\hat{y} = -3.79 + 0.897x$ B) $\hat{y} = -2.79 + 0.950x$

C) $\hat{y} = -3.79 + 0.801x$ D) $\hat{y} = -2.79 + 0.897x$

ANSWERS

1) C
2) B
3) B
4) B
5) B
6) A
7) A
8) B
9) B
10) C
11) D
12) A
13) A
14) A
15) B
16) C
17) C
18) C
19) B
20) C
21) C
22) C
23) B
24) C
25) D
26) C
27) D
28) A
29) C
30) C
31) D
32) B
33) D
34) D
35) C
36) A
37) A
38) D
39) C
40) B
41) C
42) H_0: Sex and blood type are not associated.

H_a: Sex and blood type are associated.

$\alpha = 0.05$

Critical value: $\chi^2_{0.05} = 7.815$.

Test statistic: $\chi^2 = 0.297$

Do not reject H_0. At the 5% significance level, the data do not provide sufficient evidence to conclude that an association exists between sex and blood type.

43) H_0: Political party affiliation and income are not associated.

H_a: Political party affiliation and income are associated.

$\alpha = 0.10$

Critical value: $\chi^2_{0.10} = 7.779$.

Test statistic: $\chi^2 = 27.831$.

Reject H_0. At the 10% significance level, the data provide sufficient evidence to conclude that an association exists between political party affiliation and income.

44) A

45) A