

Math 1530 Final Exam

Name _____

There are five possible responses to each of the following multiple choice questions. There is only one “BEST” answer. Be sure to read all possible choices before selecting your answer. You may mark on this examination. You should use a calculator, but it is not required. A calculator manual cannot be used. A binomial table and a confidence level table are on the last page of this exam.

FINAL EXAM

1. This is a standard deviation contest. Which of the following set of four numbers have the smallest possible standard deviation?
(A) 7, 8, 9, 10, (B) 0, 0, 10, 10 (C) 9, 9, 9, 9 (D) 0, 1, 2, 3 (E) 0, 4, 4, 8
 2. A reporter wishes to portray professional basketball players as overpaid. Which measure of center should he report as the average salary of NBA players?
(A) the mean
(B) the median
(C) the mode
(D) either the mean or the median. It doesn't matter since they will be equal.
(E) neither the mean nor the median. Both will be much lower than the actual average salary
 3. The five-number summary of a set of data
(A) is the mean, standard deviation, first quartile, median, and third quartile.
(B) can be computed from the information in a stem plot.
(C) is the mean, median, mode, standard deviation and variance.
(D) is the minimum, mean, median, interquartile range and maximum.
(E) is the minimum, first quartile, mean, third quartile and maximum.
 4. There are three senior citizens in a room, ages 68, 70 and 72. If a seventy-year-old person enters the room, the
(A) mean age will stay the same, but the variance will increase. (C) mean age will stay the same, but the variance will decrease.
(B) mean age and variance will stay the same. (D) mean age and variance will increase.
(E) mean age and the variance will decrease.
 5. A five-number summary for a set of test scores are 40, 55, 65, 75 and 95. About what percent of the test scores are between 55 and 75?
(A) 25% (B) 50% (C) 33% (D) 75% (E) can not be determined
- Use the following for the next three questions.** Birth weights at a local hospital have an approximate normal distribution with a mean of 110 ounces and a standard deviation of 15 ounces.
6. The proportion of infants born at this hospital that have birth weights above 125 ounces is
(A) 50% (B) 34% (C) 16% (D) 84% (E) 68%
 7. The proportion of infants born at this hospital that have birth weights between 125 ounces and 140 ounces is approximately
(A) 34% (B) 68% (C) 86% (D) 14% (E) 95%
 8. The largest 10% of the infants born at this hospital have birth weights that are at least how many ounces?
(A) 144 (B) 91 (C) 139 (D) 120 (E) 129

Use the following for the next three questions. Past experience has shown that the equation of the regression line relating final exam score and midterm exam score in Stat 101 for Professor Jones at State University is:

$$\text{final exam} = 50 + 0.5 \times \text{midterm exam} \quad \text{or} \quad y = 50 + 0.5x.$$

9. For a student with a midterm exam score of 50, the predicted final exam score is
(A) 50 (B) 75 (C) 50.5 (D) 100 (E) 60
10. One interpretation of the y-intercept is
(A) a student who scored 0 on the final exam would be predicted to score 50 on the midterm exam.
(B) a student who scored 2 points higher than another student on the midterm would be predicted to score 1 point higher than the other student on the final.
(C) a student who scored 0 on the midterm exam would be predicted to score 50 on the final exam.
(D) none of the above is an interpretation of the y-intercept.
11. One interpretation of the slope is
(A) a student who scored 0 on the midterm exam would be predicted to score 50 on the final exam
(B) a student who scored 0 on the final exam would be predicted to score 50 on the midterm exam.
(C) a student who scored 2 points higher than another student on the midterm would be predicted to score 1 point higher than the other student on the final.
(D) none of the above is an interpretation of the slope.
12. Which one of the following statements involving correlation is possible and reasonable?
(A) The correlation between hair color and eye color is 0.80.
(B) The correlation between left foot length and right foot length is 2.35.
(C) The correlation between hair color and age is positive.
(D) The correlation between hair color and eye color is 0.
(E) The correlation between the height of a father and the height of his first son is 0.6.
13. The value of a correlation is reported to be $r = -0.5$. Which of the following statements is correct?
(A) The x-variable explains 50% of the variability of the y-variable.
(B) The x-variable explains -25% of the variability of the y-variable.
(C) The x-variable explains 0% of the variability of the y-variable.
(D) The x-variable explains 25% of the variability of the y-variable.
(E) The x-variable explains -50% of the variability of the y-variable.
14. A study of elementary school students, ages 6 to 12, finds a high positive correlation between shoe size x and score y on a test of reading computation. The observed correlation is most likely due to
(A) the effect of a lurking variable, such as age.
(B) a mistake, since the correlation must be negative.
(C) cause and effect (larger shoe size causes higher reading comprehension).
(D) "reverse" cause and effect (higher reading comprehension causes larger shoe size).
(E) a mistake, since the correlation must be zero.

Use the following for the next three questions. According to a recent poll, about 56% of all American adults owned a cell phone at the time of the poll. The results are based on interviews with a randomly selected national sample of 801 adults, 18 years and older. The margin of error is reported to be 3.5% with a level of confidence of 95%.

15. What was the population of interest in this poll?
- (A) All American adults who own cell phones. (C) The 801 adults that participated in the poll.
(B) All American adults. (D) The participants in the survey who owned cell phones.
(E) All Americans.
16. Which of the following statements correctly interprets the reported margin of error of 3.5%?
- (A) In about 3.5% of all random samples from this population, the sample percent will equal the population percent.
(B) The probability that a 95% confidence interval based on this poll does not cover the population proportion is 3.5%.
(C) In about 95% of all random sample of this size from the same population, the difference between the population percent and the sample percent will be more than 3.5%.
(D) In about 3.5% of all random sample of this size from the same population, the difference between the population percent and the sample percent will be less than 95%.
(E) In about 95% of all random samples of this size from the same population, the difference between the population percent and the sample percent will be less than 3.5%.
17. Which one of the following statements is true, for a 95% level of confidence?
- (A) Increasing the size of the sample in a poll increases the margin of error.
(B) Increasing the size of the sample in a poll decreases the impact of response bias.
(C) Increasing the size of the sample in a poll increases the impact of response bias.
(D) Increasing the size of the sample in a poll has no impact on results.
(E) Increasing the size of the sample in a poll decreases the margin of error.
18. Last week a local radio station ask listeners to log onto their web site and respond to the following question: "Should the state of Tennessee grant Wellmont's request to build a \$41 million dollar emergency treatment center in Boone's Creek?" Of those who responded, 90% said yes, 8% said no and 2% were undecided. The population to which the results apply is
- (A) all listeners of the radio station. (C) all people in the area covered by the station.
(B) all visitors to the web site. (D) all adults in the Tri-Cities.
(E) only listeners who voted in the poll.

Use the following for the next three questions. An industrial psychologist is interested in studying the effect of room temperature and humidity on the performance of tasks requiring manual dexterity. She chooses three temperatures of 65, 80, and 95 degrees Fahrenheit with humidity of 60% and 80%. The response variable measured is the number of correct insertions, during a 15-minute period using a peg-and-hole apparatus requiring the use of both hands simultaneously. After each subject is trained on the apparatus, he or she is asked to make as many insertions as possible in a 15-minute period. Sixty factory workers used to doing repetitive tasks are randomly assigned to the different temperature and humidity combinations.

19. The experimental units in this experiment are
- (A) the number of correct insertions. (C) the factory workers.
(B) the 15-minute intervals. (D) the peg-and-hole apparatus.
(E) the three temperatures and two humidity choices.
20. The factors are
- (A) temperature and humidity. (C) the training period.
(B) the number of correct insertions. (D) the two hands used to complete the task.
(E) the sixty workers

21. The number of treatments is
(A) 6 (B) 2 (C) 3 (D) 15 (E) 60
22. Suppose that a pair of fair dice are to be tossed. The faces on each die have 1, 2, 3, 4, 5, or 6 spots on them. What is the probability that the sum of the spots on the up-faces is 5, 8, or 11?
(A) $1/4$ (B) $1/12$ (C) $3/11$ (D) $7/36$ (E) $11/36$
23. In an instant lottery your chance of winning are 0.20. If you play the lottery 5 times and outcomes are independent, the probability that you win at most once is
(A) 0.5904 (B) 0.7373 (C) 0.4096 (D) 0.2000 (E) 0.0819
24. Suppose on a 50 question multiple choice test there are five answer choices for each question. What is the expected number of correct answers of a student who guesses on each question?
(A) 20 (B) 0 (C) 10 (D) $1/5$ (E) 40
25. Twenty-five seniors from a large school district volunteer to allow their Math SAT test scores to be used in a study. These 25 seniors had a mean Math SAT score of 450. Suppose that we know that the population standard deviation of Math SAT scores for seniors in the district is 100. Assuming that the population of Math SAT scores for seniors in the district is approximately normally distributed, a 90% confidence interval for the mean Math SAT score for the population of seniors computed from these data is
(A) 450 ± 32.9 (B) not trustworthy (C) 450 ± 164.5 (D) 450 ± 39.2 (E) 450 ± 1.645
26. The incomes in a large population of college teachers have a normal distribution with mean \$75,000 and standard deviation \$10,000. Four teachers are selected at random from this population to serve on a faculty review committee. What is the probability that their mean salary is less than \$65,000?
(A) 0.1586 (B) 0.9772 (C) 0.0228 (D) 0.8414 (E) essentially 0
27. A Gallup (known, reputable, professional, polling organization) poll asked the question, "How would you rate the overall quality of the environment in this country today excellent, good, fair, or poor?" A random sample of adult Americans was contacted by phone and surveyed. In all, 46% of the sample rated the environment a good or excellent. Gallup announced the poll's margin of error for 95% confidence as ± 3 percentage points. Which of the following sources of error are included in the margin of error?
(A) the people who were missed because that they do not have phones.
(B) nonresponse - some people just don't like telephones and so do not answer them.
(C) variability due to the person who asked the question.
(D) variability due to random sampling.
(E) all sources of error are covered by the margin of error - that is why it is called the 'margin of error.'
28. In an USA criminal trial, the null hypothesis is that the defendant is innocent and the alternative hypothesis is that the defendant is guilty. Which of the following describes a Type II error for a criminal trial?
(A) A not guilty verdict for a person who is innocent. (C) A not guilty verdict for a person who is guilty.
(B) A guilty verdict for a person who is not innocent. (D) A guilty verdict for a person who is innocent.
(E) Not enough information is provided to describe a Type II error.
29. A safety officer wants to prove that the average speed of cars driven past a school is less than 25 mph. Suppose that a random sample of 14 cars showed an average speed of 24.0 mph with a sample standard deviation of 2.2 mph. Assume that speeds of cars are normally distributed. What is the appropriate alternative hypothesis?
(A) $H_a : \mu < 25$ (B) $H_a : \mu > 25$ (C) $H_a : \mu \neq 25$ (D) $H_a : \mu = 25$ (E) $H_a : \mu = 24$

30. If a difference seen in sample results is “statistically significant” it means that
- (A) there is an important difference in the sample results.
 - (B) the difference observed in the sample was unlikely to have occurred if there is no difference in the population.
 - (C) there is an important difference in the population.
 - (D) there is an important difference in the population that wasn’t reflected in the sample results.
 - (E) there is an important difference in both the sample results and the population.

Use the following for the next two questions. Suppose that you were to read about a study showing that people who sleep less than five hours a night have twice as much risk of premature death as people who sleep seven or eight hours a night.

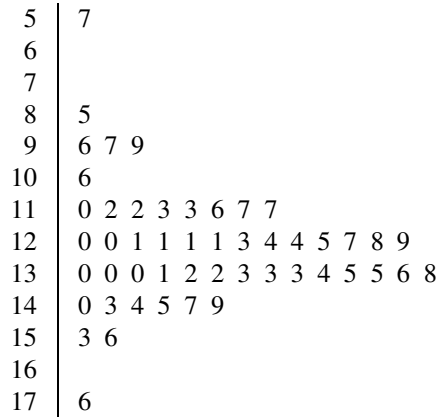
31. Can you conclude that sleeping the shorter hours causes a higher risk of premature death?
- (A) No, because the result was clearly based on an observational study.
 - (B) Yes, because the result was clearly based on a randomized experiment.
 - (C) The answer depends on whether the research was based on an observational study or a randomized experiment, and it isn’t obvious which was used.
 - (D) The answer depends on the level of significance which was not provided.
 - (E) The answer depends on the P-value which was not provided.
32. Which of the following is not an example of a possible confounding or lurking variable in this study?
- (A) Medication a person is taking.
 - (B) The amount of alcohol a person drinks in the evening.
 - (C) The amount of sleep a person gets at night.
 - (D) The amount of stress a person is under in their work.
 - (E) The age of a person.
33. Suppose that we want a 90% confidence interval for the average amount of time (in minutes) spent per week on homework by the students in Math 1530 at East Tennessee State University. The interval is to have a margin of error of 2 minutes. You may assume the amount of time spent has a normal distribution with a standard deviation of 30 minutes. The number of observations required is approximately
- (A) 600
 - (B) 25
 - (C) 30
 - (D) 860
 - (E) 2435
34. The Survey of Study Habits and Attitudes (SSHA) is a psychological test that measures the motivation, attitudes, and study habits of college students. Scores range from 0 to 200 and follow (approximately) a normal distribution with mean 115 and standard deviation 25. You suspect that incoming freshmen at Eastern State University have a mean which is different from 115, since they are often excited yet anxious about entering college. To verify your suspicion, you test the hypotheses

$$H_0 : \mu = 115 \text{ vs. } H_a : \mu \neq 115$$

You give the SSHA to 25 randomly selected incoming students and find their mean score is 116.2. Assuming that scores of all incoming freshmen are approximately normal, with the same standard deviation as the scores of all college students, the P-value of the test is

- (A) 0.4052
 - (B) 0.2026
 - (C) 0.2302
 - (D) 0.1151
 - (E) 0.8104
35. Which of the following is an example of a matched pair experimental design?
- (A) A teacher compares the scores of students using a computer based method of instruction, with the scores of other students using a traditional method.
 - (B) A teacher compares the scores of students in her class on a standardized test with the national average score.
 - (C) A teacher calculates the average of scores of students on a pair of tests and wishes to see if this average is larger than 80%.
 - (D) A teacher compares pre-test and post-test scores of students.
 - (E) A teacher compares scores of students on a test with the scores of the students’ best friend.

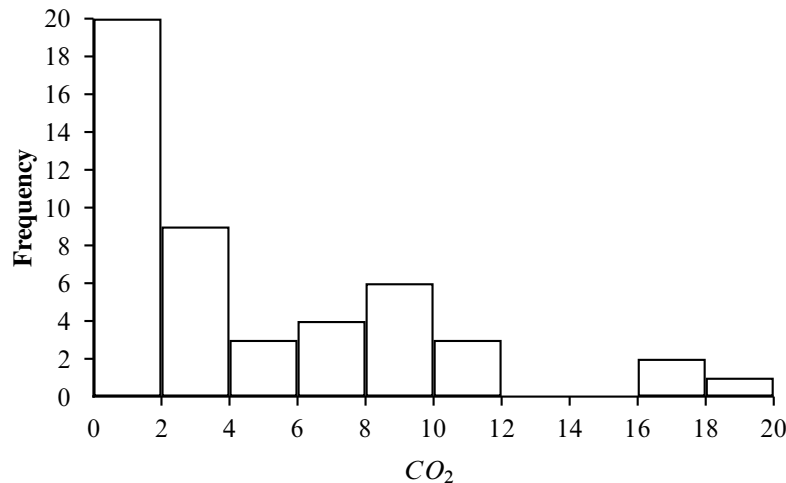
36. A researcher measures the correlation between two variables. This correlation tells us
- (A) whether there is a relation between two quantitative variables.
 - (B) the strength and direction of the straight line relation between two variables.
 - (C) whether there is a relation between two categorical variables.
 - (D) whether or not there is an interesting pattern in a scatterplot.
 - (E) whether a cause and effect relation exists between two variables.
37. The population of the United States is aging, though less rapidly than in other developed countries. Here is a stemplot of the percents of residents aged 65 and older in the 50 states, according to the 2000 census. The stems are whole percents and the leaves are tenths of a percent.



The center of the distribution is close to

- (A) 14.0%
 - (B) 5.7% to 17.6%
 - (C) 138%
 - (D) 12.7%
 - (E) 11.0%
38. Burning fuels in power plants or motor vehicles emits carbon dioxide (CO_2), which contributes to global warming. The following descriptive statistics and histogram represent CO_2 emissions per person from countries with populations of at least 20 million.

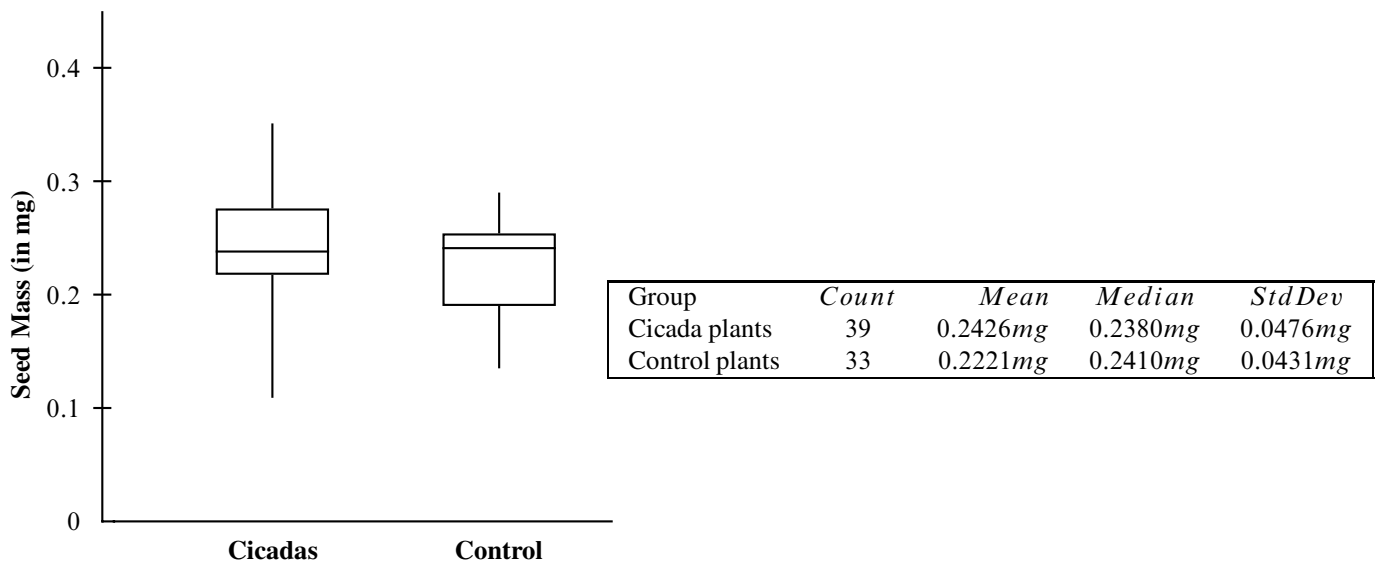
Descriptive Statistics: CO_2 (metric tons per person)								
Variable	N	Mean	Variance	Minimum	Q1	Median	Q3	Maximum
CO_2 emissions	48	4.596	23.253	0	0.750	3.200	7.800	19.900



Which of the following best describes the shape of the distribution of CO_2 emissions?

- (A) Somewhat symmetric
- (B) Strongly skewed left
- (C) The five-number summary
- (D) Strongly skewed right with an outlier
- (E) Mean = 4.596, Median = 3.200, and standard deviation = 2.144

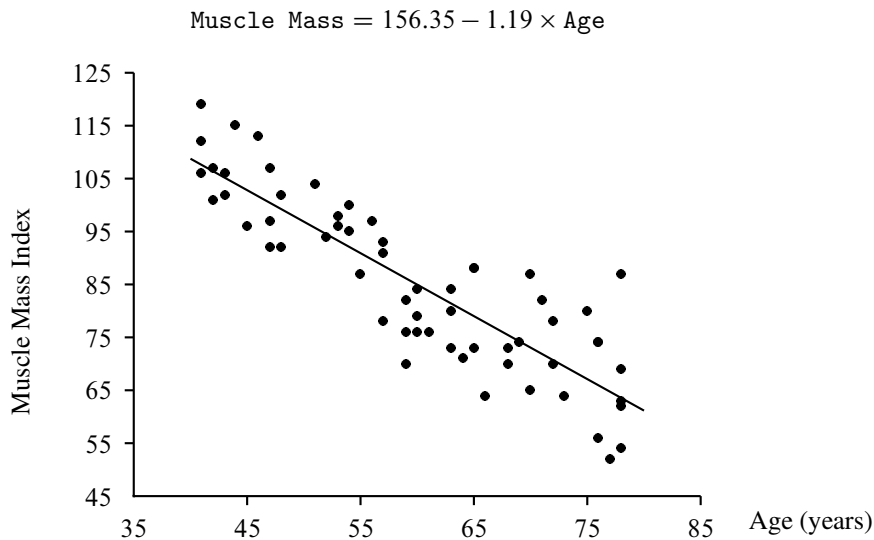
39. Researchers interviewed a group of women with knee pain awaiting knee replacement surgery. They also interviewed a group of women from the same geographical area with no knee pain. These researchers reported that wearing high-heeled shoes caused the knee pain which required surgery. As a savvy consumer of statistics, you conclude that:
- (A) Because this was only an observational study, the researchers should not make claims that the knee pain was caused by high heels.
 - (B) Because the study was a valid experiment, the researchers were valid in their claim about high heels causing pain.
 - (C) The p-value of the test must have been small to conclude a cause and effect outcome.
 - (D) The correlation between wearing high-heeled shoes and knee pain must be 1.
 - (E) This is a classic example of Simpson's Paradox, i.e., the association between high-heeled shoes and knee pain would not hold if the data were combined to form a single group.
40. *Byte* magazine chooses its "best-brand of printer" by looking at responses from readers who mail in a survey printed in the magazine. Identify the type of sampling used in this example.
- (A) simple random sampling
 - (B) systematic sampling
 - (C) stratified random sampling
 - (D) census
 - (E) voluntary response sampling
41. Every 17 years, swarms of cicadas emerge from the ground in the eastern United States, live for about six weeks, then die. There are so many cicadas that their dead bodies can serve as fertilizer and increase plant growth. In an experiment, a researcher added 10 cicadas under some plants in a natural plot of American bellflowers in a forest, leaving other plants undisturbed. One of the response variables was the size of seeds produced by the plants. Below are some summary statistics and comparative boxplots of the seed mass in milligrams for the two groups.



Do the data support the idea that dead cicadas can serve as fertilizer?

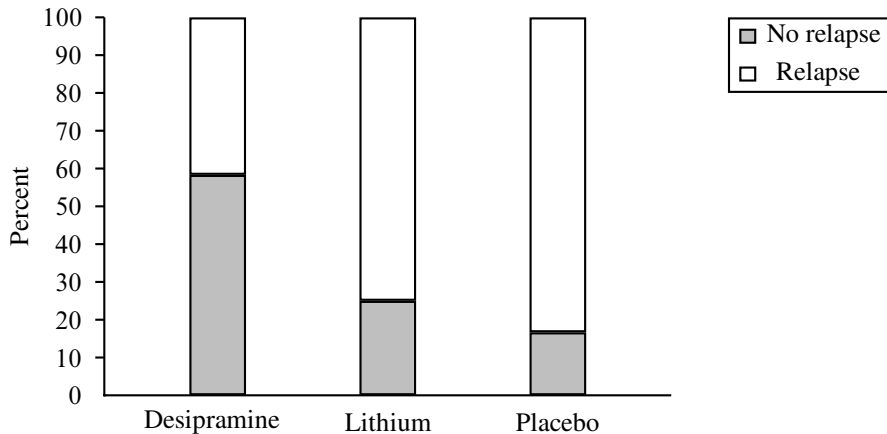
- (A) Yes, the dead cicadas are significantly better than the control group.
- (B) Yes, the distribution of seed mass for the cicada group is fairly symmetric and the distribution of seed mass for the control group is slightly skewed left.
- (C) Yes, there is more variability in the control group.
- (D) No, the mean and the median disagree.
- (E) No, the boxplots show little difference; the means (0.2426 mg for cicada, 0.2221 mg for control) and medians (0.2380 mg for cicada, 0.2410 mg for control) are also similar. The variability in seed mass for the cicada group is slightly larger than the control group.

42. A person’s muscle mass is expected to decrease with age. To explore this relationship in women, a nutritionist randomly selected 15 women from each 10-year age group, beginning with age 40 and ending with age 79. The observations and least-squares regression line appear in the scatterplot. The correlation between the two variables is $r = -0.866$ and the least-squares regression line for predicting muscle mass index (MMI) from age (years) is



The estimated muscle mass index for a female who is 60 years old is

- (A) 60. (B) 85. (C) 96. (D) 86.6. (E) 80.
43. Cocaine addiction is hard to break. Addicts need cocaine to feel any pleasure, so perhaps giving them an antidepressant drug will help. An experiment assigned 72 chronic cocaine users to take either an antidepressant drug called desipramine, lithium, or a placebo. (Lithium is a standard drug to treat cocaine addiction. A placebo is a dummy drug, used so that the effect of being in the study but not taking any drug can be seen.) One-third of the subjects, chosen at random, received each drug. Here are the results after three years of the three treatments in preventing relapse.



What can this study conclude?

- (A) Nearly 60% of the desipramine users did not have a relapse, while 25% of the lithium users and about 17% of those who received placebos succeeded in breaking their addictions. Desipramine seems to be effective.
- (B) Nearly 40% of the desipramine users did not have a relapse, while 75% of the lithium users and about 83% of those who received placebos succeeded in breaking their addictions. Desipramine seems to be ineffective.
- (C) Nearly 60% of the desipramine users did have a relapse, while 25% of the lithium users and about 17% of those who received placebos did not succeed in breaking their addictions.
- (D) There aren’t any differences between the treatments since the bars are of equal height.
- (E) Treatment and recovery rate are negatively correlated. In other words, as the treatment level decreases so does the percent of the addicts that have no relapse.

44. The National Weather Service has the following model for the random variable X = the number of hurricanes that hit North Carolina in a year:

Number of hurricanes X	0	1	2	3	4	5
Probability	.30	.35	.20	.10	.04	?

What is the probability that there will be more than three hurricanes in a year?

- (A) 0.04 (B) 0.10 (C) 0.05 (D) 0.95 (E) 0.15

Use the following for the next two questions. The nutritional status of 1000 elementary school children was assessed and recorded as “poor,” “adequate,” or “excellent.” The academic performance for those children was rated as “below average,” “average,” or “above average.” The data are displayed below.

		<i>Nutritional Status</i>			Totals
		Poor	Adequate	Excellent	
<i>Academic Performance</i>	Below Average	70	95	35	200
	Average	130	450	30	610
	Above Average	90	30	70	190
Totals		290	575	135	1000

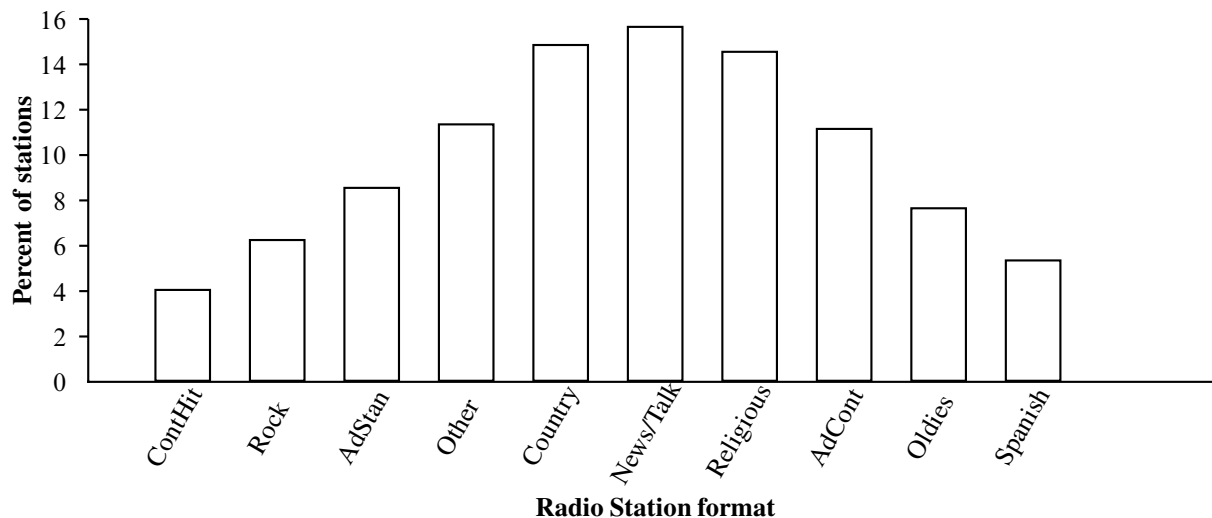
45. If you choose a elementary school child at random, what is the probability that the child you choose is below average academically?
 (A) 0.2414 (B) 0.3500 (C) 0.2000 (D) 0.2900 (E) 0.0700
46. What is the probability that a randomly chosen child is below average academically, given that the child chosen had a poor nutritional status?
 (A) 0.3500 (B) 0.2000 (C) 0.2900 (D) 0.2414 (E) 0.0700
47. Vigorous exercise helps people live several years longer (on the average). Whether mild activities like slow walking extend life is not clear. Suppose that the added life expectancy from regular slow walking is just 2 months. A statistical test is more likely to find a significant increase in mean life if
 (A) it is based on a very small random sample. (C) the test of hypotheses is not rejected.
 (B) the p-value is large. (D) it is based on a very large random sample.
 (E) The size of the sample doesn't have any effect on the significance of the test.
48. A medical researcher is working on a new treatment for a certain type of cancer. The average survival time after diagnosis on the standard treatment is two years. In an early trial, she tries the new treatment on three subjects who have an average survival time after diagnosis of four years. Although the survival time has doubled, the results are not statistically significant even at the 0.10 significance level. The explanation is
 (A) the sample size is small.
 (B) the placebo effect is present, which limits statistical significance.
 (C) that although the survival time has doubled, in reality the actual increase is really two years.
 (D) the calculation was in error. The researchers forgot to include the sample size.
 (E) that the p-value is smaller than the 0.10 significance level.

Use the following for the next two questions. Recent revenue shortfalls in a southern state led to the budget reduction for higher education. To offset the reduction, the largest state university proposed a 25% tuition increase. Random samples of 50 freshmen, 50 sophomores, 50 juniors, and 50 seniors were asked whether they were strongly opposed to the increase, given that it was the minimum increase necessary to maintain the university's budget at current levels. The survey results are given in the following table:

Strongly Opposed	Year			
	Freshman	Sophomore	Junior	Senior
YES	39	36	29	18
NO	11	14	21	32

49. To compare the four classes (year in school) with respect to their opinion regarding the proposed tuition increase, which distribution should we calculate?
- (A) The joint distribution of year in school and opinion.
 (B) The marginal distribution of opinion.
 (C) The conditional distribution of opinion given year in school.
 (D) The conditional distribution of year in school given opinion.
 (E) The marginal distribution of year.
50. What null hypothesis should be tested by the Chi-square test?
- (A) The distributions of the number who are strongly opposed versus not strongly opposed are the same for the four years.
 (B) The correlation between year and strongly opposed is very strong.
 (C) The mean number of students who are strongly opposed is the same for the four years.
 (D) The distributions of the total number of students sampled in each of the four years is the same.
 (E) Any one of the above could be used as the null hypothesis.

Use the following for the next two questions. The radio audience rating service Arbitron places the country's 13,838 radio stations into categories that describe the kind of programs they broadcast. The following bar graph shows the distribution of station formats:



51. What feature(s) best describe the distribution of radio station formats?
- (A) The distribution looks bell-shaped with a mean of News/Talk.
 (B) News/Talk is the mode of the distribution.
 (C) The distribution is slightly skewed left with a center around News/Talk.
 (D) The distribution is somewhat symmetric with a center around News/Talk plus or minus 1 standard deviation
 (E) The distribution is slightly skewed right, but it is hard to tell without knowing the mean and median.

52. What **individuals** are considered in the data?

- (A) The 10 station formats.
- (B) The 13,838 radio station managers.
- (C) The 13,838 radio stations.
- (D) All the listeners of the 13,838 radio stations
- (E) The employees of Arbitron.

Use the following for the next 2 questions. At what age do infants speak their first word of English? Here are the data on 20 children (ages in months):

15 26 10 9 15 20 18 11 8 20
7 9 10 11 11 10 12 17 11 10

In fact, the sample contained one more child, who began to speak at 42 months. Child development experts consider this abnormally late, so it was dropped to get a sample of “normal” children.

Minitab output:

Stem-and-leaf of age $N = 20$
Leaf Unit = 1.0

```

1  0  7
4  0  899
(8) 1  00001111
8  1  2
7  1  55
5  1  7
4  1  8
3  2  00
1  2
1  2  6
    
```

One-Sample T: age								
Test of mu = 12 vs > 12								
						95%		
						Lower		
Variable	N	Mean	StDev	SE Mean	Lower Bound	T	P	
age	20	13.0000	4.9311	1.1026	11.0934	0.91	0.188	

53. Is there good evidence the mean age at first word among all “normal” children is greater than one year?

- (A) Yes, there is strong evidence that the mean age at first word is greater than one year.
- (B) Since the sample mean is 13 months we should reject the null hypothesis.
- (C) Yes, since we are 95% confident that the mean age at first word is at least 11.0934 months.
- (D) Yes, since there is only an 18.8% chance that the null hypothesis ($\mu = 12$) is correct.
- (E) There doesn't appear to be enough evidence to suggest the mean age at first word is greater than one year.

54. Any reason(s) why we should question the use of the t-procedure?

- (A) No, the use of the t-procedure is appropriate when σ is unknown.
- (B) Yes, the z-test should have been used instead of the t-test.
- (C) No, the above analysis is appropriate to answer the research question since the data are based on a sample of “normal” children.
- (D) Yes, the sample size needs to be at least 30 in order to use the t-procedure.
- (E) Yes, the use of the t-procedure should be questioned because the stemplot shows that the data are right-skewed with a high outlier. In addition, it is important that the data are an SRS.

Binomial Probability Table

		<i>P</i>											
<i>n</i>	<i>x</i>	.01	.05	.10	.15	.20	.25	.30	1/3	.35	.40	.45	.50
1	0	0.9900	0.9500	0.9000	0.8500	0.8000	0.7500	0.7000	0.6667	0.6500	0.6000	0.5500	0.5000
	1	0.0100	0.0500	0.1000	0.1500	0.2000	0.2500	0.3000	0.3333	0.3500	0.4000	0.4500	0.5000
2	0	0.9801	0.9025	0.8100	0.7225	0.6400	0.5625	0.4900	0.4444	0.4225	0.3600	0.3025	0.2500
	1	0.0198	0.0950	0.1800	0.2550	0.3200	0.3750	0.4200	0.4444	0.4550	0.4800	0.4950	0.5000
	2	0.0001	0.0025	0.0100	0.0225	0.0400	0.0625	0.0900	0.1111	0.1225	0.1600	0.2025	0.2500
3	0	0.9703	0.8574	0.7290	0.6141	0.5120	0.4219	0.3430	0.2963	0.2746	0.2160	0.1664	0.1250
	1	0.0294	0.1354	0.2430	0.3251	0.3840	0.4219	0.4410	0.4444	0.4436	0.4320	0.4084	0.3750
	2	0.0003	0.0071	0.0270	0.0574	0.0960	0.1406	0.1890	0.2222	0.2389	0.2880	0.3341	0.3750
	3	0.0000	0.0001	0.0010	0.0034	0.0080	0.0156	0.0270	0.0370	0.0429	0.0640	0.0911	0.1250
4	0	0.9606	0.8145	0.6561	0.5220	0.4096	0.3164	0.2401	0.1975	0.1785	0.1296	0.0915	0.0625
	1	0.0388	0.1715	0.2916	0.3685	0.4096	0.4219	0.4116	0.3951	0.3845	0.3456	0.2995	0.2500
	2	0.0006	0.0135	0.0486	0.0975	0.1536	0.2109	0.2646	0.2963	0.3105	0.3456	0.3675	0.3750
	3	0.0000	0.0005	0.0036	0.0115	0.0256	0.0469	0.0756	0.0988	0.1115	0.1536	0.2005	0.2500
	4	0.0000	0.0000	0.0001	0.0005	0.0016	0.0039	0.0081	0.0123	0.0150	0.0256	0.0410	0.0625
5	0	0.9510	0.7738	0.5905	0.4437	0.3277	0.2373	0.1681	0.1317	0.1160	0.0778	0.0503	0.0313
	1	0.0480	0.2036	0.3280	0.3915	0.4096	0.3955	0.3601	0.3292	0.3124	0.2592	0.2059	0.1562
	2	0.0010	0.0214	0.0729	0.1382	0.2048	0.2637	0.3087	0.3292	0.3364	0.3456	0.3369	0.3125
	3	0.0000	0.0011	0.0081	0.0244	0.0512	0.0879	0.1323	0.1646	0.1811	0.2304	0.2757	0.3125
	4	0.0000	0.0000	0.0005	0.0022	0.0064	0.0146	0.0283	0.0412	0.0488	0.0768	0.1128	0.1562
	5	0.0000	0.0000	0.0000	0.0001	0.0003	0.0010	0.0024	0.0041	0.0053	0.0102	0.0185	0.0313
6	0	0.9415	0.7351	0.5314	0.3771	0.2621	0.1780	0.1176	0.0878	0.0754	0.0467	0.0277	0.0156
	1	0.0571	0.2321	0.3543	0.3993	0.3932	0.3560	0.3025	0.2634	0.2437	0.1866	0.1359	0.0938
	2	0.0014	0.0305	0.0984	0.1762	0.2458	0.2966	0.3241	0.3292	0.3280	0.3110	0.2780	0.2344
	3	0.0000	0.0021	0.0146	0.0415	0.0819	0.1318	0.1852	0.2195	0.2355	0.2765	0.3032	0.3125
	4	0.0000	0.0001	0.0012	0.0055	0.0154	0.0330	0.0595	0.0823	0.0951	0.1382	0.1861	0.2344
	5	0.0000	0.0000	0.0001	0.0004	0.0015	0.0044	0.0102	0.0165	0.0205	0.0369	0.0609	0.0938
	6	0.0000	0.0000	0.0000	0.0000	0.0001	0.0002	0.0007	0.0014	0.0018	0.0041	0.0083	0.0156
7	0	0.9321	0.6983	0.4783	0.3206	0.2097	0.1335	0.0824	0.0585	0.0490	0.0280	0.0152	0.0078
	1	0.0659	0.2573	0.3720	0.3960	0.3670	0.3115	0.2471	0.2048	0.1848	0.1306	0.0872	0.0547
	2	0.0020	0.0406	0.1240	0.2097	0.2753	0.3115	0.3177	0.3073	0.2985	0.2613	0.2140	0.1641
	3	0.0000	0.0036	0.0230	0.0617	0.1147	0.1730	0.2269	0.2561	0.2679	0.2903	0.2918	0.2734
	4	0.0000	0.0002	0.0026	0.0109	0.0287	0.0577	0.0972	0.1280	0.1442	0.1935	0.2388	0.2734
	5	0.0000	0.0000	0.0002	0.0012	0.0043	0.0115	0.0250	0.0384	0.0466	0.0774	0.1172	0.1641
	6	0.0000	0.0000	0.0000	0.0001	0.0004	0.0013	0.0036	0.0064	0.0084	0.0172	0.0320	0.0547
	7	0.0000	0.0000	0.0000	0.0000	0.0000	0.0001	0.0002	0.0005	0.0006	0.0016	0.0037	0.0078
8	0	0.9227	0.6634	0.4305	0.2725	0.1678	0.1001	0.0576	0.0390	0.0319	0.0168	0.0084	0.0039
	1	0.0746	0.2793	0.3826	0.3847	0.3355	0.2670	0.1977	0.1561	0.1373	0.0896	0.0548	0.0312
	2	0.0026	0.0515	0.1488	0.2376	0.2936	0.3115	0.2965	0.2731	0.2587	0.2090	0.1569	0.1094
	3	0.0001	0.0054	0.0331	0.0839	0.1468	0.2076	0.2541	0.2731	0.2786	0.2787	0.2568	0.2187
	4	0.0000	0.0004	0.0046	0.0185	0.0459	0.0865	0.1361	0.1707	0.1875	0.2322	0.2627	0.2734
	5	0.0000	0.0000	0.0004	0.0026	0.0092	0.0231	0.0467	0.0683	0.0808	0.1239	0.1719	0.2187
	6	0.0000	0.0000	0.0000	0.0002	0.0011	0.0038	0.0100	0.0171	0.0217	0.0413	0.0703	0.1094
	7	0.0000	0.0000	0.0000	0.0000	0.0001	0.0004	0.0012	0.0024	0.0033	0.0079	0.0164	0.0312
	8	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0001	0.0002	0.0002	0.0007	0.0017	0.0039

CONFIDENCE LEVEL	TAIL AREA	<i>z</i> *
80%	0.1000	1.282
90%	0.0500	1.645
95%	0.0250	1.960
96%	0.0200	2.054
98%	0.0100	2.326
99%	0.0050	2.576
99.5%	0.0025	2.807