

**Math 1530 Final Exam**  
**May 2009**

Name \_\_\_\_\_  
Section # \_\_\_\_\_  
Instructor \_\_\_\_\_

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 can use a calculator but a calculator manual cannot be used.

**FINAL EXAM**

1. Here are 12 scores from a Math 1530 Exam:

84 76 92 96 88 96 68 80 92 88 76 96

One of the 12 scores was omitted from the stemplot:

6		8
7		66
8		0488
9		2266

The missing number is

(A) 96 (B) 88 (C) 92 (D) 76 (E) 2266

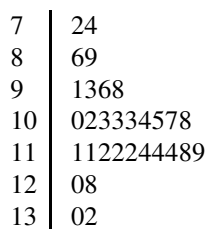
2. When dealing with financial data (such as salaries or lawsuit settlements), we often find that the shape of the distribution is \_\_\_\_\_. When the distribution has this shape, the \_\_\_\_\_ is pulled toward the long tail of the distribution, but the \_\_\_\_\_ is less affected. The sequence of words to correctly complete this statement is:

- (A) right skewed, median, mean. (C) right skewed, mean, standard deviation.  
(B) left skewed, median, standard deviation. (D) roughly symmetric, mean, standard deviation.  
(E) right skewed, mean, median.

**Use the following for the next 2 questions.** Suppose that the blood alcohol count (BAC) of students who drink 5 beers varies from student to student according to a normal distribution with mean 0.08 and standard deviation 0.01.

3. What percent of students who drink 5 beers have a BAC above 0.08 (the legal limit for driving in all states)?  
(A) 50% (B) 2.5% (C) 5% (D) 16% (E) 32%
4. The middle 95% of students who drink 5 beers have a BAC between  
(A) 0.07 and 0.09. (B) 0.05 and 0.11. (C) 0.06 and 0.10. (D) 0.04 and 0.12. (E) 0% and 8%.
5. The weights of dormitory cockroaches follow a normal distribution with mean 80 grams and standard deviation 2 grams. What is the third quartile of the distribution of weights?  
(A) 78.66 grams. (B) 75%. (C) 84 grams. (D) 82 grams. (E) 81.35 grams.
6. The number of deaths among persons aged 15 to 24 years in the United States in 2003 due to the leading causes of death for this age group were: accidents, 14,966; homicide, 5148; suicide, 3921; cancer, 1628; heart disease, 1083; congenital defects, 425. To display these data you should construct a  
(A) bar graph. (B) histogram. (C) stemplot. (D) time plot. (E) 5-number summary.
7. Suppose you wanted to compare the number of weekly hours of TV watching of males and females. You should construct  
(A) a histogram. (B) bar graphs. (C) pie charts. (D) a time plot. (E) a side-by-side box plot.

8. Here is a stemplot of IQ test scores of 31 seventh-grade girls in a Midwest school district.



The overall shape of this distribution is

- (A) somewhat symmetric. (B) strongly skewed right. (C) strongly skewed left. (D) on the right-side. (E) uniform.

**Use the following for the next 2 questions.** The following data (sorted) are the percents of state residents who were born outside the United States.

1.2	1.8	1.9	2.1	2.2	2.7	2.7	2.8	2.9	3.2	3.3	3.6	3.8
3.8	3.9	3.9	4.1	4.2	4.4	4.9	5.1	5.4	5.6	5.6	5.9	6.3
6.6	6.9	7.0	8.1	8.3	9.2	9.7	10.1	10.1	10.3	12.2	12.4	12.6
12.7	12.9	13.8	14.1	15.1	15.9	16.3	18.9	19.1	20.1	21.6	27.2	

9. Which of the following best describes the distribution?

- (A) Ignoring the outlier(s), it is close to symmetric. The mean will be close to the median.  
 (B) The distribution is double-peaked and has an outlier.  
 (C) The distribution is strongly skewed left and has several peaks. The center of the distribution is around 10% with a spread of 20%.  
 (D) Flat, resembles a uniform distribution.  
 (E) The distribution is right skewed with a peak which lies between 0% and 5% of residents that are foreign born. There is a possible outlier.

10. The center of the distribution is close to

- (A) 10% (B) 6.3% (C) 50% (D) 4.9% (E) the modes: 2.7%, 3.8%, 3.9%, 5.6%, 10.1%.

11. Here are the number of hours that each of a group of students studied for an exam:

2 4 22 2 1 4 1 5 5 4

What is the mean number of study hours?

- (A) 5 (B) 2.5 (C) 4 (D) 4.5 (E) 50

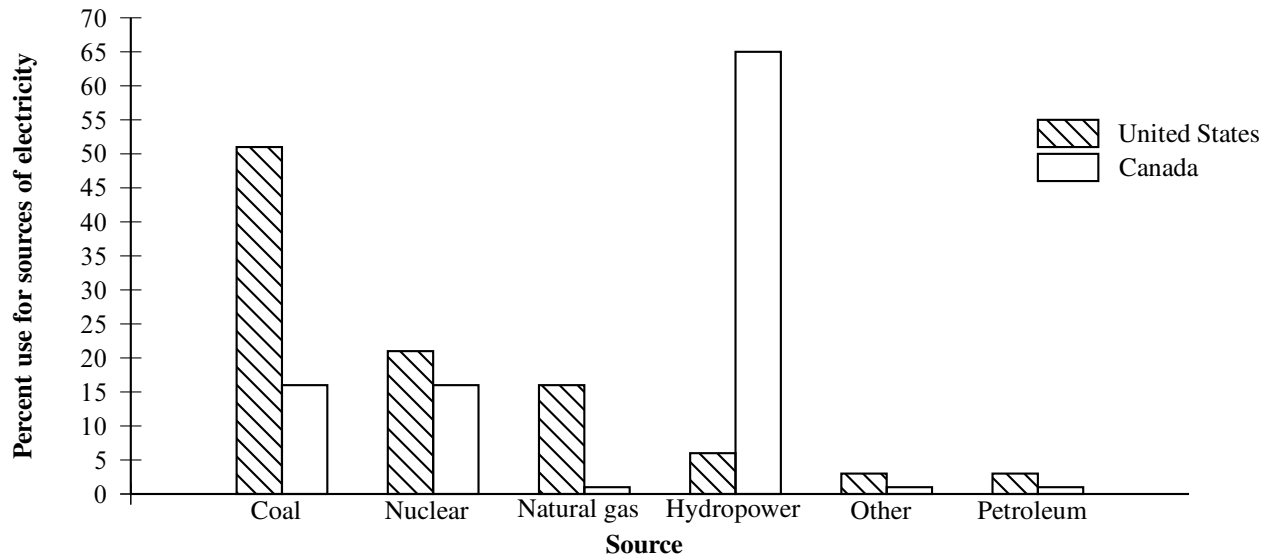
12. The *Three Stooges* were a comedy act that made a series of 190 short films over the period from 1934 to 1958. Their comedy was centered around slapstick and cartoonish violence. If we count the average number of times per film that someone was slapped over a 24 year period, then we get the following numbers (listed in order from smallest to largest):

6.4	7.6	8.5	8.9	9.9	10.2	10.5	10.6	11.4	11.6	12.2	13.6
13.7	14.0	14.4	14.8	15.6	16.0	17.8	19.6	21.1	23.1	31.9	33.5

The five-number summary of the data is

- (A) 6.4, 10.35, 22.95, 16.9, 33.5 (C) 6.4, 10.35, 13.65, 16.9, 33.5  
 (B) 6.4, 10.35, 13.6, 13.7, 16.9, 33.5 (D) 1, 6.5, 12.5, 18.5, 24  
 (E) 1934, 1940.5, 1946.5, 1952.5, 1958

Use the following for the next 2 questions. The following bar graphs show sources of electricity and their use in the United States and Canada.



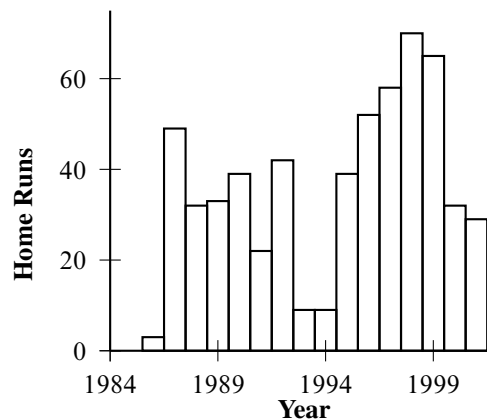
13. About what percent of electricity comes from renewable energy sources (Hydropower or Other (i.e. solar, wind)) in the United States ?

- (A) 3% (B) 5% (C) 9% (D) 65% (E) 70%

14. Which of the following is correct?

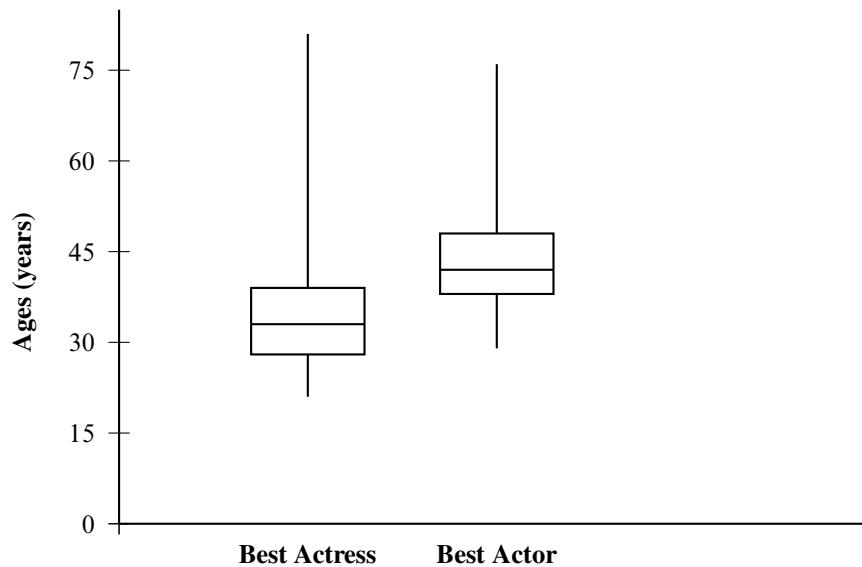
- (A) The distribution of electricity is skewed right in the United States and irregular in Canada.
- (B) The distribution of electricity is multi-modal.
- (C) The overall shape is difficult to gage but the center is somewhere between natural gas and hydropower.
- (D) The distribution is nearly symmetric.
- (E) The top sources of electricity are coal and hydropower in the United States and Canada, respectively.

15. A student was asked to make a histogram of the number of home runs hit by Mark McGwire from 1986 to 2001. Here is the student's graph. Comment on this graph.



- (A) This is not correct. The horizontal axis should split the number of home runs recorded into classes. The vertical axis should show the number of years in each class.
- (B) The distribution of home runs looks bimodal with a center of 1993 and a spread of 16 years.
- (C) The distribution is skewed left.
- (D) The distribution is skewed right with a center of 1993.
- (E) The distribution is nearly symmetric around 1993.

Use the following for the next 3 questions. *And the Oscar goes to...* Here are the boxplots of the ages of all Oscar winners for the Best Actress and Best Actor.



16. This plot shows that
- (A) there is less diversity in age among the Best Actresses than among the Best Actors.
  - (B) the Best Actresses are generally younger than the Best Actors.
  - (C) the oldest person winning a Best Actor/Actress award was a man.
  - (D) the youngest man winning a Best Actor award is younger than the youngest woman winning a Best Actress award.
  - (E) the margin of error in age among the Best Actresses is larger than the margin of error in age among the Best Actors.
17. We see from the plot that the median age of the Best Actor is about
- (A) 42. (B) 33. (C) 47. (D) impossible to know. (E) 30.
18. The main advantage of boxplots over stemplots and histograms is
- (A) boxplots make it easy to compare several distributions, as in this example.
  - (B) boxplots show more detail about the shape of the distribution.
  - (C) boxplots use the five-number summary, whereas stemplots and histograms use the mean and standard deviation.
  - (D) boxplots show skewed distributions, whereas stemplots and histograms show only symmetric distributions.
  - (E) boxplots show symmetric distributions, whereas stemplots and histograms show only skewed distributions.
19. The Chamber of Commerce of a small town has kept track of the sales of the only local ice cream shop and the number of cars entering the parking lot at the beach that is close to the town for the past 14 summers. We plot the data and find that there is a high positive correlation between the two variables. The observed correlation is most likely due to
- (A) a mistake, the correlation must be negative.
  - (B) both variables are related to the average temperature during the summer.
  - (C) people eat ice cream only at the beach.
  - (D) people feel like going to the beach when they eat ice cream.
  - (E) a mistake, the correlation must be zero.

20. Movies earn income from many sources other than theater showings. Here are data on the income of movie studios from two sources over time, in billions of dollars (the amounts have been adjusted to the same buying power that a dollar had in 2004):

	1948	1980	1985	1990	1995	2000	2004
Theater showings	7.8	4.5	3.04	5.28	5.72	6.02	7.40
Video/DVD sales	0	0.2	2.40	6.02	10.90	11.97	20.90

Compare the two sources of income. Which of the following is correct?

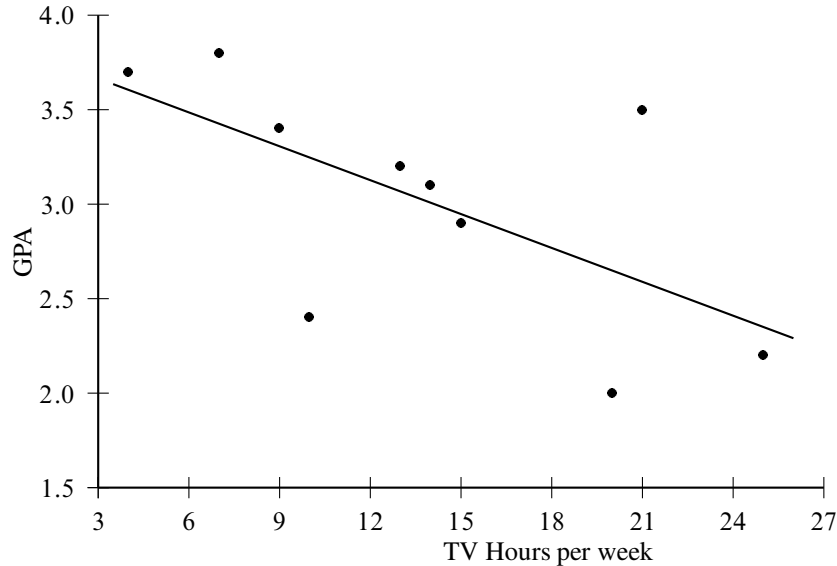
- (A) Always income from videos has been higher than income from theater showings.  
 (B) Always income from theater showings is higher because tickets are more expensive than renting a movie.  
 (C) There is a strong negative correlation, when one grows the other one goes down.  
 (D) Income from theater showings has been relatively flat or steady, while video and DVD sales have grown tremendously.  
 (E) The median is 1990.
21. You see a student standing in front of the student center, now and then stopping other students to ask them questions. She says that she is collecting student opinions for a class assignment. Identify the type of sampling method.
- (A) simple random sampling    (C) stratified random sampling  
 (B) bias random sampling    (D) census  
 (E) convenience sampling
22. Does regular exercise reduce the risk of a heart attack? Here are two ways to study this question.
- (1) A researcher finds 2000 men over 40 who exercise regularly and have not had heart attacks. She matches each with a similar man who does not exercise regularly, and she follows both groups for 5 years.  
 (2) Another researcher finds 4000 men over 40 who have not had heart attacks and are willing to participate in a study. She assigns 2000 of the men to a regular program of supervised exercise. The other 2000 continue their usual habits. The researcher follows both groups for 5 years.

Which of the following is correct?

- (A) Both designs are experiments.  
 (B) The first design is an observational study, and the second is an experiment.  
 (C) The first design is an experiment, and the second is an observational study.  
 (D) Both designs are observational studies.  
 (E) The first design is an SRS and the second is a stratified random sample.
23. The Community Intervention Trial for Smoking Cessation asked whether a community-wide advertising campaign would reduce smoking. The researchers located 11 pairs of communities, each pair similar in location, size, economic status, and so on. One community in each pair participated in the advertising campaign and the other did not. To decide which community in each pair should get the advertising campaign the researchers tossed a coin. This is
- (A) a completely randomized experiment.    (C) a stratified random sample.  
 (B) a matched pairs experiment.    (D) an observational study.  
 (E) an uncontrolled experiment.

Use the following for the next 3 questions. Can we predict grade point average (GPA) by knowing the number of hours per week a student watches TV? The observations and least-squares regression line appear in the scatterplot. The correlation between the two variables is  $r = -0.63$  and the least-squares regression line for predicting GPA using TV Hours per week is

$$\text{GPA} = 3.84 - 0.06 \times \text{TV Hours}$$



24. Describe the association between *GPA* and *TV Hours*.
- (A) There appears to be a moderately strong positive linear relationship.  
 (B) There appears to be weak relationship since  $r = -0.63$  is smaller than 0.  
 (C) There appears to a weak linear relationship because of the two clusters of data.  
 (D) About 63% of the variation in the GPA can be explained by the least-squares regression line.  
 (E) There appears to be a moderately strong negative linear relationship.
25. Explain what the slope of the line means in this context.
- (A) Since the correlation is  $-0.63$ , grade point average decreases by about 40%.  
 (B) Grade point average increases by about 3.84 on the average.  
 (C) The number of hours per week a student watches TV lasts on the average of about 3.84 hours.  
 (D) For every one hour per week increase of TV watching, grade point average goes down .06 on the average.  
 (E) As grade point average goes up, the number of TV hours goes down by .06 on the average.
26. We select a student at random from the population, and ask how many hours per week do you watch TV, the student answers 10 hours per week. Predict the GPA:
- (A) about 2.40 (B) about 3.84 (C) about 0.60 (D) about 3.24 (E) about 4.44
27. A tire manufacturer sells a tire that has a mean life of 32,000 miles with a standard deviation of 2500 miles. A new manufacturing process is being tested and there is interest in knowing the mean life  $\mu$  of the new tires. How large a sample is required in order to get a margin of error no larger than  $\pm 1000$  miles with 95% confidence? You may assume that the standard deviation is 2500 miles.
- (A) 5 (B) 23% (C) 25 (D) 7 (E) 1000

**Use the following for the next 4 questions.** Can changing diet reduce high blood pressure? Vegetarian diets and low-salt diets are both promising. There are 240 men with high blood pressure to serve as subjects and they are to be assigned at random to four diets: (1) normal diet with unrestricted salt; (2) vegetarian with unrestricted salt; (3) normal with restricted salt; and (4) vegetarian with restricted salt. The study ran for 8 weeks.

28. This experiment has
- (A) four subjects (C) four factors, the four diets being compared  
 (B) two factors, normal/vegetarian diet and unrestricted/restricted salt (D) two factors, low and high blood pressure.  
 (E) a statistically significant effect.
29. Software assigns an SRS of 60 men to Diet 1, an SRS of 60 of the remaining 180 to Diet 2, and an SRS of 60 of the remaining 120 to Diet 3. The 60 who are left get Diet 4. This is a
- (A) block design, with four blocks. (C) controlled observational study.  
 (B) matched pairs design. (D) completely randomized design.  
 (E) stratified random sample.
30. An important response variable in this experiment is
- (A) control, randomization and replication. (C) normal/vegetarian diet or unrestricted/restricted salt.  
 (B) the randomization of the subjects to the treatments. (D) the change in blood pressure after 8 weeks on the assigned diet.  
 (E) the length of the study.
31. It turned out that the group of men that were on the vegetarian diet with restricted salt had reduced their high blood pressure the most. The researchers said the results were statistically significant at the 0.05 significance level. What does “statistically significant” mean in this context?
- (A) Perhaps the results are attributable to some confounding variable (e.g., exercise).  
 (B) They mean that the change in blood pressure for the men on the vegetarian diet with restricted salt was larger than what they would expect to occur by chance alone.  
 (C) The results are of practical importance and this can be stated with 95% confidence.  
 (D) The chance that the null hypothesis is true is very small.  
 (E) The chance that there is no difference between the diets, when in fact there truly is one, is only 0.05.
32. A recent national study showed that approximately 45% of college students binge drink. Let  $X$  equal the number of students in a random sample of size  $n = 5$  who binge drink. The probability distribution of  $X$  is:

Number of binge drinkers $X$	0	1	2	3	4	5
Probability	0.0503	0.2059	0.3369	0.2757	0.1128	0.0184

What is the probability that there will be at most one binge drinker in the sample?

- (A) 0.2059 (B) 0.2562 (C) 0.0503 (D) 0.9497 (E) 0.7438
33. Consider the following example from research on statistical reasoning (Nisbett, et al., 1987 in *Science*). There are two hospitals: in the first one, 120 babies are born every day, in the other, only 12. On average, the ratio of baby boys to baby girls born every day in each hospital is 50/50. However, one day, in one of those hospitals twice as many baby girls were born as baby boys. In which hospital was it more likely to happen? Explain.
- (A) It is much more likely to happen in the larger hospital since the number of births is larger.  
 (B) It is much more likely to happen in the small hospital. The reason for this is that technically speaking, the probability of a random deviation of a particular size (from the population mean), decreases with the increase in the sample size.  
 (C) In the larger hospital 80/120 is greater than 8/12.  
 (D) Equally likely 80/120 is equal to 8/12.  
 (E) It is equally likely to be 20 babies far from 60 than 2 babies far from 6.

Use the following for the next 4 questions. Government data give the following counts of violent deaths in a recent year among people 20 to 24 years of age by gender and cause of death:

**Tabulated statistics: Gender, Cause of Death**

Rows: Gender		Columns: Cause of Death			
	Accidents	Homicide	Suicide	All	
Female	1818	457	345	2620	
Male	6457	2870	2152	11,479	
All	8275	3327	2497	14,099	

Cell Contents:      Count

34. The conditional probability that the victim was male, given that the death was accidental, is about  
 (A) 0.56 (B) 0.59 (C) 0.46 (D) 0.78 (E) 0.81
35. What is the probability that the death was accidental, given that we know the victim was male?  
 (A) 0.78 (B) 0.59 (C) 0.46 (D) 0.56 (E) 0.81
36. If one of the 14,099 victims is selected at random, the probability that the victim was male is about  
 (A) 0.19 (B) 0.4579757 (C) 11,479 (D) 11,479/2620 (E) 0.81
37. Find the marginal distribution of gender. What does this distribution tell us?  
 (A) About 59% of the deaths were due to accidents, About 24% of the deaths were due to homicides, About 18% of the deaths were due to suicides  
 (B) Men and women are equally likely to have a violent death.  
 (C) Accident is overall the most common cause of a violent death.  
 (D) Over 4 times as many males than females died of a violent death.  
 (E) Females are more likely than males to die of an accident but males are more likely than females to die by homicide or suicide.
38. The coach of a college men's basketball team records the resting heart rates of the 15 members. You should not trust a confidence interval for the mean resting heart rate of all male students at this college based on these data because  
 (A) the members of the basketball team can't be considered a random sample of all students.  
 (B) with only 15 observations, the margin of error will be small.  
 (C) heart rates may not have a Normal distribution.  
 (D) We can't calculate a sample mean with 15 observations.  
 (E) We do not know the standard deviation in the population.
39. A study released last March brings into sharper focus the healing power of "good" cholesterol. Researchers report that they have linked an increased level of good cholesterol, or HDL, with a reduction in the amount of plaque clogging up patients' arteries. A statistical test is more likely to find a significant increased level of HDL 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.



40. The New Yorker magazine wants to know what % of its subscribers have taken a trip abroad during the past year. They have thousands of subscribers, from them they take a random sample of 3,000 and mail them a questionnaire. They receive 780 questionnaires back, from those 780 subscribers 420 took a trip abroad during the last year. This is an example of
- (A) a survey with little bias because a large SRS was used.
  - (B) an invalid survey because not all the subscribers received the questionnaire.
  - (C) an invalid survey because not all who answer took a trip.
  - (D) a survey containing nonresponse.
  - (E) a stratified random sample.
41. A Gallup (known, reputable, professional, polling organization) poll asked the question, “With which one of these statements about the environment and the economy do you most agree? Protection of the environment should be given priority, even at the risk of curbing economic growth. OR, Economic growth should be given priority, even if the environment suffers to some extent.” A random sample of 1,012 adults nationwide were contacted and surveyed. In all, 51% of the sample said that Economic growth should be given priority, even if the environment suffers to some extent. Gallup announced the polls margin of error for 95% confidence as  $\pm 3$  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 to respond to surveys
  - (C) variability due to the person who asked the question
  - (D) variability due to random sampling (or sampling variability)
  - (E) all sources of error are covered by the margin of error - that is why it is called the ‘margin of error’

**Use the following for the next 2 questions.** Cola makers test new recipes for loss of sweetness during storage. Trained tasters rate the sweetness before and after storage. Here are the sweetness losses (sweetness before storage minus sweetness after storage) found by 10 tasters for one new cola recipe:

2.0 0.4 0.7 2.0 -0.4 2.2 -1.3 1.2 1.1 2.3

**Minitab output:**

Stem-and-leaf of sweetness  $N = 10$   
 Leaf Unit = 0.10

```

1  -1  3
2  -0  4
4   0  47
(2)  1  12
4   2  0023
    
```

One-Sample T: sweetness							
Test of mu = 0 vs > 0							
						95%	
						lower	
Variable	N	Mean	StDev	SE Mean	Bound	T	P
sweetness	10	1.02	1.196	0.378	0.327	2.697	0.0123

42. Are these data good evidence that the cola lost sweetness? Use  $\alpha = .05$ .
- (A) Yes, there is strong evidence for a loss of sweetness.
  - (B) No, there is insufficient evidence to suggest that the mean sweetness is less than 0.
  - (C) Yes, since there is only a 1.23% chance that the null hypothesis ( $\mu = 0$ ) is correct.
  - (D) No, there is evidence to suggest that the cola gained sweetness after storage since  $\bar{x} = 1.02$ .
  - (E) Yes, since  $\bar{x} = 1.02$  and not equal to 0.
43. Are the conditions for inference satisfied?
- (A) Yes, the use of the t-procedure is always appropriate when  $\sigma$  is unknown.
  - (B) No, the z-test should have been used instead of the t-test.
  - (C) Possibly no since the stemplot illustrates that the shape does appear to be somewhat skewed. Hence, the p-value for the t test may be only approximately accurate.
  - (D) Yes, the above analysis is appropriate to answer the research question since the data are based on a sample of trained tasters.
  - (E) No, the sample size needs to be at least 30 in order to use the t-procedure.

44. An opinion poll asks an SRS of 100 college seniors how they view their job prospects. In all, 53 say “Good.” Does the poll give reason to conclude that more than half of all seniors think their job prospects are good? The hypotheses for a test to answer this question are
- (A)  $H_0 : p = 0.5, H_a : p < 0.5$       (C)  $H_0 : p = 0.5, H_a : p > 0.5$   
(B)  $H_0 : \hat{p} = 0.53, H_a : \hat{p} > 0.53$       (D)  $H_0 : \hat{p} = 0.5, H_a : \hat{p} > 0.5$   
(E)  $H_0 : \mu = 50, H_a : \mu > 50$
- Use the following for the next 5 questions.** A recent Gallup Poll interviewed a random sample of 1600 adult Americans. Of these, 960 bought a lottery ticket in the past year.
45. What is the population of interest in this poll?
- (A) The 1600 adult Americans interviewed      (C) The 960 adult Americans who answered yes to the question.  
(B) All adult Americans      (D) The Gallup Poll  
(E) The proportion of adults that answered yes in the poll.
46. What is the parameter to be estimated?
- (A) 1600  
(B) 0.60  
(C) The proportion of adult Americans who bought a lottery ticket in the past year.  
(D) The probability is extremely small to win the lottery.  
(E) 960
47. Based on the sample collected, what is the estimated value of the parameter?
- (A) 960      (C) 1600  
(B) 0.60      (D) The probability of winning the lottery is close to 0.  
(E) Unknown, we need to take a census.
48. With 95% confidence, estimate the proportion of the adult Americans who bought a lottery ticket in the past year.
- (A)  $1600 \pm 38$     (B)  $960 \pm 38$     (C)  $0.60 \pm 1.96$     (D)  $0.6 \pm 0.00011025$     (E)  $0.60 \pm 0.0240$
49. If the 1600 people had called a 900 number to give their opinion, how would this affect the confidence interval in the previous question?
- (A) It would be narrower because voluntary response polls are less variable than SRSs.  
(B) It would be wider because voluntary response polls have a bigger margin of error than SRSs.  
(C) A confidence interval makes no sense for a voluntary response sample.  
(D) Not at all, because the width of the confidence interval depends only on the sample size, and not on how the sample was obtained.  
(E) Not at all, because the width of the confidence interval depends only on the sample size, and not on the population size.
50. Many women take oral contraceptives to prevent pregnancy. Under ideal conditions, 1% of women taking the pill become pregnant within one year. A random sample of 8 women taking the pill is to be taken. What is the probability that at least one of the women becomes pregnant under ideal conditions?
- (A) 0.0100    (B) 0.9227    (C) 0.0773    (D) 1/8    (E) 0.6634

51. A bottle of Coca-Cola displays the statement “20 FL OZ.” Let  $\mu$  denote the mean fluid content per bottle for all Coca-Cola bottles. People who drink Coca-Cola would probably be disturbed if it turned out that the true average fluid content was less than the claimed value. We carry out a test of the hypotheses:  $H_0 : \mu = 20$  and  $H_a : \mu < 20$ . Which is a correct description of the Type I error?
- (A) We believe the advertisement but the true average content is below 20 oz.
  - (B) The true average fluid content is 20 oz. but we decide that it is lower.
  - (C) The true average fluid content is 20 oz. but we decide that it is higher.
  - (D) The true average fluid content is 20 oz. but we decide that it is different.
  - (E) The p-value of the test must be smaller than  $\alpha$ .
52. A poll of 1,234 adults found that 62% expect an increase in environmental pollution in the next decade. Take the poll’s sample to be an SRS of all adults. The poll estimates a 95% confidence interval to be  $0.62 \pm 0.028$ , or between 59.2% and 64.8%. Which of these statements about adults who expect an increase in environmental pollution in the next decade?
- (A) With 95% confidence, the percent of the population who expect pollution to increase is 62%.
  - (B) With 95% confidence, the percent of the sample who expect pollution to increase is between 59.2% and 64.8%.
  - (C) It is probably true that 62% of all adults expect an increase in environmental pollution.
  - (D) With 95% confidence, the percent of all adults who expect pollution to increase is between 59.2% and 64.8%.
  - (E) We can be absolutely certain that the poll result is within 2.8 percentage points of the truth about the population.
53. A government report says that a 90% confidence interval for the mean income of American households is  $\$59,067 \pm \$356$ . Is the mean income significantly different from  $\$59,000$ ?
- (A) It is not significantly different at the 10% level but might be significantly different at the 5% level.
  - (B) Yes, it is significantly different at the 10% level.
  - (C) Yes, since  $\$59,067$  is significantly higher than  $\$59,000$ .
  - (D) It is not significantly different at the 10% level and therefore is also not significantly different at the 5% level.
  - (E) Yes, we are 90% confident that the mean income of all American households is different from  $\$59,000$ .

# 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