INSTRUCTIONS:
Write your name, lab section #, and ID# above. Note the statement at the bottom of this page that you must sign when you are finished with the exam.

Supply the following information on SIDE ONE of the scantron sheet:
⇒ Enter your name (last name first!) in the "name" section; no nicknames! FILL IN THE BUBBLES.
⇒ Enter your 3 digit lab section number in the "special code" section. FILL IN THE BUBBLES.
⇒ Enter your student identification number in the "identification number" section. FILL IN THE BUBBLES.
⇒ IMPORTANT! Enter the version number (either "1", "2" or "3") of your copy of the exam in the section marked "GRADE OR EDUCATION". The version number of this test is 1. BUBBLE IN THIS NUMBER!

There are 18 multiple choice questions. On the test circle the letter that corresponds to the answer you select. Also indicate your selection on the opscan sheet. Use a #2 pencil!

• For each wrong answer 5 points will be subtracted from 100.

• When you are finished: separate your scantron sheet from the test!
  i) place the 1st page of your test in the proper lab section stack on the auditorium stage
  ii) place your scantron sheet in the folder labeled with your version of the test.

GOOD LUCK!!

Statement of academic honesty:

I have neither given assistance to another student nor received assistance from another student while taking this exam.

Signed____________________
1. To help students reduce the cost of textbooks, the State of California University System gathered data from the top 5 (in terms of books sold) online textbook websites. Information was gathered on textbook cost, convenience of use (number of clicks to check out and finalize purchase), length of time to receive books, and customer service. Select the choice below that completely describes the Who; What; Why for this data.
   a. All textbooks; Textbook cost, convenience of use, length of time to receive books, customer service; Sell more books.
   b. Top 5 online textbook websites; Textbooks; Encourage students to buy books from California-based web sites.
   c. All textbooks; Textbook cost, convenience of use, length of time to receive books, customer service; Help students reduce cost of textbooks.
   d. Top 5 online textbook websites; Textbook cost, convenience of use, length of time to receive books, customer service; Help students reduce cost of textbooks.
   e. Students at California universities; Textbooks; Help students reduce cost of textbooks.

2. Parking at a university has become a problem. University administrators are interested in determining the mean time it takes a student to find a parking spot. Several administrators inconspicuously followed 300 students and recorded the how long it took each of them to find a parking spot. Identify the “What” in this data gathering procedure.
   a. number of empty parking spots
   b. students who drive cars on campus
   c. time to find a parking spot
   d. mean time spent per week looking for a parking spot
   e. number of students who cannot find a spot

Questions 3 and 4 refer to the following table containing data from eight high schools on smoking among 5375 students and among their parents:

<table>
<thead>
<tr>
<th>Student</th>
<th>Student</th>
</tr>
</thead>
<tbody>
<tr>
<td>Both parents smoke</td>
<td>400</td>
</tr>
<tr>
<td>One parent smokes</td>
<td>416</td>
</tr>
<tr>
<td>Neither parent smokes</td>
<td>188</td>
</tr>
</tbody>
</table>

3. What percent of these students smoke?
   a. 23%  b. 39.8%  c. 33.1%  d. 18.7%  e. 81.3%

4. What percent of students smoke among those with two smoking parents, among those with one smoking parent, and among those with neither parent smoking?
   a. (28.9%, 22.8%, 16%)  b. (9.2%, 9.5%, 4.3%)  c. (22.5%, 41.4%, 18.7%)  d. (22.5%, 18.6%, 13.9%)  

5. The amount of soda injected into 12 ounce cans by a filling machine is symmetric and mound-shaped with a standard deviation of .05 ounces. To avoid lawsuits the company wants only 2.5% of the cans to be underfilled, that is, to be filled with less than 12 ounces of soda. The mean amount of soda injected by the machine into each can should be what value to satisfy this criterion?
   a. 11.95 ounces  b. 12 ounces  c. 12.05 ounces  d. 11.90 ounces  e. 12.1 ounces

6. A local plumber makes house calls. She charges $30 to come out to the house and $40 per hour for her services. For example, a 4-hour service call costs $30 + $40(4) = $190. The table shows a summary of the hours the plumber spent on service calls during the past month.

<table>
<thead>
<tr>
<th>Statistic</th>
<th>Hours of Service Call</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>4.5</td>
</tr>
<tr>
<td>Median</td>
<td>3.5</td>
</tr>
<tr>
<td>Standard deviation</td>
<td>1.2</td>
</tr>
<tr>
<td>IQR</td>
<td>2.0</td>
</tr>
<tr>
<td>Minimum</td>
<td>0.5</td>
</tr>
</tbody>
</table>

One particular service call made by the plumber cost $138. What is the z-score corresponding to this cost?
   a. 1.5  b. −1.5  c. −0.923  d. −0.875  e. 0.923
Questions 7 and 10 refer to the tables below.

**Table 1.** Patient Survival by Hospital

<table>
<thead>
<tr>
<th>Patient Outcome</th>
<th>Survived</th>
<th>Died</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hospital A</td>
<td>800</td>
<td>200</td>
<td>1000</td>
</tr>
<tr>
<td>Hospital B</td>
<td>900</td>
<td>100</td>
<td>1000</td>
</tr>
</tbody>
</table>

**Table 2.** Patient Survival by Condition Before Treatment and Hospital

<table>
<thead>
<tr>
<th>Condition Before Treatment</th>
<th>Patient Outcome</th>
<th>Patient Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Survived</td>
<td>Died</td>
</tr>
<tr>
<td>Hospital A</td>
<td>590</td>
<td>10</td>
</tr>
<tr>
<td>Hospital B</td>
<td>870</td>
<td>30</td>
</tr>
</tbody>
</table>

7. From Table 1, the survival rate for patients in Hospital A, when compared to the survival rate in Hospital B, is
   a. the same   b. lower   c. higher   d. cannot determine

8. From Table 2, the survival rate for each patient condition for Hospital A, when compared to the survival rate for each patient condition for Hospital B, is
   a. the same   b. lower   c. higher   d. cannot determine

9. The phenomenon indicated by your answers to questions 7 and 8 is referred to as
   a. skewness   b. lies, damn lies, and statistics   c. Simpson's paradox   d. an oxymoron   e. quartile reversal

10. A straightforward explanation for the above phenomenon is:
    a. a hospital accountant “juggled” the numbers to deceive federal regulators
    b. emergency room procedures at Hospital B were recently changed
    c. one of the hospitals has a higher rating by the medical insurance ratings board
    d. one of the hospitals has recently changed its medical supplies vendor
    e. patients in poor condition before treatment are more likely to die; Hospital A treats more patients of this type

11. On the final exam in his history class Parker has a standardized score (z-score) of +1.7. This means that Parker's exam score
    a. is 1.7 points above the mean score.
    b. is 1.7 standard deviations above the mean score.
    c. has a standard deviation of 1.7.
    d. has a score that is 1.7 times the means score.
    e. would have to be multiplied by 1.7 to equal the mean score.
12. Three statistics classes (50 students each) took the same test. Shown below are the histograms of the scores for each of the classes. Below the histograms are the boxplots (labeled A, B, and C) of the scores for each of the classes. Match the histogram for each class with its corresponding boxplot.

A) Class 1 is B  Class 2 is C  Class 3 is A
B) Class 1 is C  Class 2 is A  Class 3 is B
C) Class 1 is A  Class 2 is B  Class 3 is C
D) Class 1 is B  Class 2 is A  Class 3 is C
E) Class 1 is C

Questions 13 and 14 refer to the following:
Here are the summary statistics for the weekly payroll of a small company: lowest salary = $450, mean salary = $950, median salary = $730, range = $1400, IQR = $850, first quartile = $500, standard deviation = $470.

13. Between what two values are the middle 50% of the salaries found?
   a.  $500 and $850  b.  $950 and $1420  c.  $500 and $1350  d.  $500 and $1420  e.  $950 and $1350

14. Suppose business has been good, and the company gives each employee a $50 raise. What is the new value of IQR?
   a.  $900  b.  $850  c.  $470  d.  $520  e.  $875
Use the following to answer questions 15-16:

A sample was taken of the salaries of 20 employees of a large company. The following are the salaries (in thousands of dollars) for this year. For convenience, the data are ordered.

28 31 34 35 37 41 42 42 42 47 49 51 52 52 60 61 67 72 75 77

15. If you calculate the first quartile using the method in the coursepack, the first quartile of the above data is
   a. $36,000  b. $60,500  c. $35,000  d. $39,000  e. $61,000.

16. If each employee in the sample receives a salary increase of $3,000, then the standard deviation $s$ of the new salaries will
   a. increase by $3,000  
   b. increase by $\sqrt{3,000}$  
   c. decrease by $3,000  
   d. be the same as the standard deviation of the original salaries  
   e. equal the original standard deviation times $\sqrt{3,000}$

Use the following to answer questions 17-18:

The following two histograms represent the distribution of acceptance rates (percent of applicants accepted) among 25 business schools in 2005. The histograms use different class intervals but are based on the same data. In each class interval, the left endpoint is included but not the right.

17. What percent of the schools have an acceptance rate under 20%?
   a. 16%  b. 36%  c. 4%  d. 24%  e. 28%

18. Which interval contains fewer than half of all the observations?
   a. 22.5% ≤ acceptance rate < 37.5%  
   b. 30% ≤ acceptance rate < 45%  
   c. 25% ≤ acceptance rate < 40%  
   d. 20% ≤ acceptance rate < 35%

19. A simple random sample of size $n$ is defined to be
   a. A sample of size $n$ chosen in such a way that every unit in the population has the same chance of being selected
   b. a sample of size $n$ chosen in such a way that every unit in the population has a nonzero chance of being selected
   c. A sample of size $n$ chosen in such a way that every set of $n$ units in the population has an equal chance to be the sample actually selected.
   d. All of the above. They are essentially equivalent definitions.
20. In Raleigh, NC, population 350,000, a simple random sample of 1000 voters is selected to estimate the outcome of an upcoming election for US president. In the state of Illinois, population 12,400,000, a simple random sample of 1000 voters is selected to estimate the outcome of an upcoming election for US president. In the United States, population 305,000,000, a simple random sample of 1000 voters is selected to estimate the outcome of an upcoming election for US president. We conclude

a. the sample from Raleigh is the least representative of its population, the sample from Illinois is the second most representative of its population, and the sample from the United States is the most representative of its population.

b. the sample from Raleigh is the most representative of its population, the sample from Illinois is the second most representative of its population, and the sample from the United States is the least representative of its population.

c. the samples from Raleigh, Illinois, and the United States are equally representative of their respective populations.

d. the sample from Raleigh is the least representative of its population, while the samples from Illinois and the United States are equally representative of their respective populations since their populations are so much larger than Raleigh's population.

e. it is impossible to make any statements about how well the samples represent their respective populations since the samples were selected from different government entities: city, state, country.

21. The human resources department at a large high-tech company plans to conduct an employee satisfaction study by sampling 100 employees from the 3,000 total employees. They plan to use systematic random sampling since the employee file is in alphabetical order. The first employee selected for the study should be:

a. the 30th employee
b. employee 1 to 30 randomly selected
c. employee 1 to 100 randomly selected
d. the first employee
e. employee 1 to 300 randomly selected

22. A simple random sample of size four must be selected from the following employees of a small company:

2. Curly 5. Groucho 8. Zeppo

Use the numerical labels next to the names above and the following list of random digits. Read the list of random digits from left to right, starting with the top row of digits.

11709 20495 35907 41384 44982 20751 27498 12009 45287 71753 98236 66419 84533

The simple random sample is

a. 1179
b. Larry, then Larry again, Harpo, Gummo
c. Larry, Harpo, Gummo, Curly
d. Larry, then Larry again, Harpo, then stop
e. Larry, Curly, Moe, Shemp

ANSWERS

1) d 2) c 3) d 4) d 5) e 6) b 7) b 8) c 9) c 10) e 11) b 12) b 13) c 14) b 15) d 16) d 17) a 18) b 19) c 20) c 21) b 22) c