Final Exam

- Write your full name, your SUID and your section.
- There are 9 pages in this test with 9 problems. You are responsible for checking the number of pages and problems.
- Write clearly, and give sufficient details to justify your answers.
- The use of mobile phones or pagers is not allowed.
- You can use your textbook but lecture notes are strictly not allowed.
- You can use any calculator except the ones that use wireless communication.

Question 1: /08
Question 2: /08
Question 3: /10
Question 4: /10
Question 5: /10
Question 6: /14
Question 7: /15
Question 8: /15
Question 9: /10

TOTAL: /100
1. In each statement, identify which of these sampling is used: random, systematic, convenience, stratified, or cluster.

(a) A survey of SU professors is done by selecting every 10th professor listed in the SU telephone directory.

(b) An education researcher randomly selects 3 middle schools in New York State and interviews all the teachers at each of these selected schools about their salary satisfaction.

2. Construct a Leaf and Stem Plot of the following data:

1.4, 2.3, 4.4, 3.6, 3.5, 4.5, 3.2, 3.7, 4.0, 5.1, 4.2, 5.3
3. Consider the following sample of data values

17, 12, 18, 13, 9, 24, 30, 14, 32, 39, 20, 22, 15, 21, 23.

(a) Find the percentile of the data value 21.

(b) Find \( P_{50} \), the value of the 60th percentile.
4. The table below classifies a group of voters according to gender and political affiliation.

<table>
<thead>
<tr>
<th></th>
<th>Democrat</th>
<th>Republican</th>
<th>Independent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>115</td>
<td>271</td>
<td>53</td>
</tr>
<tr>
<td>Female</td>
<td>299</td>
<td>142</td>
<td>47</td>
</tr>
</tbody>
</table>

(a) What is the total number of voters in this group?

(b) If a person is chosen at random from this group of voters, what is the probability of selecting a female or Democrat voter.
5. A survey shows that 60% of university students own laptops. If 8 university students are selected at random, find

(a) the probability that exactly 6 of them own laptops.

(b) the probability that at least 6 of them own laptops.
6. The length of life of an instrument produced by a machine has a normal distribution with a mean of 33 months and standard deviation of 5 months.

(a) Find the probability that an instrument produced by this machine will last more that 42.2 months.

(b) Find the length of life $T$ for which 79% of instruments produced by this machine will last less than $T$ months.
7. Based on a simple random sample, a 98% confidence interval for a population proportion is given by

\[( 0.55 , 0.65 ).\]

(a) Find the sample proportion \( \hat{p} \), and the margin of error \( E \).

(b) Find the necessary sample size \( n \) to obtain the above confidence interval.
8. From a simple random sample of 420 students from a college, 189 of them said that they like their fitness center. Construct 95% confidence interval for the proportion of all students who like the fitness center of such a college.
9. A simple random sample of 33 scores of statistics exams at a college has a sample average score of 80 points, and a sample standard deviation of 8 points. Find a 99% confidence interval for the true population mean of all scores of statistics exams at such a college.
Syracuse University
Probability and Statistics for the Liberal Arts I
MAT121 Spring 2015
Instructor: Dr. A. Bourhim

Name: -------------------------------
SUID: -------------------------------
Section: -------------------------------

Final Exam

• Write your full name, your SUID and your section.
• There are 9 pages in this test with 9 problems. You are responsible for checking the number of pages and problems.
• Write clearly and legibly, and verify your answers.
• The use of calculators is allowed.
• You cannot bring any notes, books, or electronic devices into the exam. The use of wireless communication is strictly not allowed.
• You cannot bring anything except the exam paper into the exam room.

Question 6: /14
Question 7: /15
Question 8: /15
Question 9: /10

TOTAL: /100
1. In each statement, identify which of these sampling is used: random, systematic, convenience, stratified, or cluster.

(a) An education researcher randomly selects 10 teachers from each and every college in New York State, and interviews them about their salary satisfaction.

(b) A statistics professor surveyed all of his students to obtain a sample data consisting of the number of credit cards students possess.

2. Construct a Leaf and Stem Plot of the following data:

   1.4, 1.1, 3.0, 3.6, 2.5, 5.5, 1.2, 3.7, 4.0, 5.1, 4.2, 5.3
3. Consider the following sample of data values

27, 32, 18, 13, 9, 22, 30, 14, 23, 39, 20, 22, 15, 21, 23.

(a) Find the percentile of the data value 18.

(b) Find $P_{80}$, the value of the 80th percentile.
4. The table below classifies a group voters according to gender and political affiliation.

<table>
<thead>
<tr>
<th></th>
<th>Democrat</th>
<th>Republican</th>
<th>Independent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>145</td>
<td>221</td>
<td>13</td>
</tr>
<tr>
<td>Female</td>
<td>199</td>
<td>112</td>
<td>37</td>
</tr>
</tbody>
</table>

(a) What is the total number of voters in this group?

(b) If a person is chosen at random from this group of voters, what is the probability of selecting a female or Democrat voter.
5. A survey shows that 70% of university students own laptops. If 7 university students are selected at random, find

(a) the probability that exactly 5 of them own laptops.

(b) the probability that at least 5 of them own laptops.
6. The length of life of an instrument produced by a machine has a normal distribution with a mean of 19 months and standard deviation of 2.5 months.

(a) Find the probability that an instrument produced by this machine will last more than 23.2 months.

(b) Find the length of life \( T \) for which 84% of instruments produced by this machine will last less than \( T \) months.
7. Based on a simple random sample, a 95% confidence interval for a population proportion is given by

\((0.63, 0.67)\).

(a) Find the sample proportion \(\hat{p}\), and the margin of error \(E\).

(b) Find the necessary sample size \(n\) to obtain the above confidence interval.
8. From a simple random sample of 320 students from a college, 272 of them said that they like their fitness center. Construct 99% confidence interval for the proportion of all students who like the fitness center of such a college.
9. A simple random sample of 40 scores of statistics exams at a college has a sample average score of 78 points, and a sample standard deviation of 11 points. Find a 98% confidence interval for the true population mean of all scores of statistics exams at such a college.
Final Exam

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- Write clearly, and give sufficient details.
- The use of mobile phones or other electronic devices is prohibited.
- You can use your textbook.
- You can use any calculator.

Question 3: 

Question 4: 

Question 5: 

Question 6: 

Question 7: /15 

Question 8: /15 

Question 9: /10 

TOTAL: /100
1. In each statement, identify which of these sampling is used: random, systematic, convenience, stratified, or cluster.

(a) A researcher randomly selects 2 Walmart stores in New York State, and then surveys all the employees at each store about their salary satisfaction.

(b) To test the effects of caffeine on study habits of students, a statistics professor surveyed all of his students.

2. Construct a Leaf and Stem Plot of the following data:

1.4, 2.1, 4.0, 3.6, 2.5, 4.5, 1.2, 3.7, 4.0, 5.1, 4.2, 5.3
3. Consider the following sample of data values

    27, 32, 18, 13, 9, 22, 30, 14, 23, 39, 20, 22, 15, 21, 23.

(a) Find the percentile of the data value 21.

(b) Find $P_{50}$, the value of the 60th percentile.
4. The table below classifies a group of voters according to gender and political affiliation.

<table>
<thead>
<tr>
<th></th>
<th>Democrat</th>
<th>Republican</th>
<th>Independent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>215</td>
<td>251</td>
<td>33</td>
</tr>
<tr>
<td>Female</td>
<td>299</td>
<td>172</td>
<td>67</td>
</tr>
</tbody>
</table>

(a) What is the total number of voters in this group?

(b) If a person is chosen at random from this group of voters, what is the probability of selecting a female or Democrat voter.
5. A survey shows that 80% of university students own laptops. If 8 university students are selected at random, find

(a) the probability that exactly 6 of them own laptops.

(b) the probability that at least 6 of them own laptops.
6. The length of life of an instrument produced by a machine has a normal distribution with a mean of 12 months and standard deviation of 2 months.

(a) Find the probability that an instrument produced by this machine will last more than 15.5 months.

(b) Find the length of life $T$ for which 73% of instruments produced by this machine will last less than $T$ months.
7. Based on a simple random sample, a 95% confidence interval for a population proportion is given by

$$(0.70, 0.76).$$

(a) Find the sample proportion $\hat{p}$, and the margin of error $E$.

(b) Find the necessary sample size $n$ to obtain the above confidence interval.
8. From a simple random sample of 560 students from a college, 364 of them said that they like their fitness center. Construct 99% confidence interval for the proportion of all students who like the fitness center of such a college.
9. A simple random sample of 36 scores of statistics exams at a college has a sample average score of 76 points, and a sample standard deviation of 10 points. Find a 98% confidence interval for the true population mean of all scores of statistics exams at such a college.