BUS 3613, Business Statistics
Practice Test 2, Spring 2010

Your test will be of similar content and material, but the questions will be different and the questions may be asked if a different manner. The test questions will come from all the material we have covered in class.

This is a closed book, closed note test, and should be your work only. You may use a calculator as well as the provided formula sheet and tables during this exam. Stay calm, read all of the instructions, and show your work when applicable. If you use your calculator, please indicate what keys you are choosing. Some unjustified answers will receive minimal credit.

1. The American Association of Individual Investors publishes an annual guide to the top mutual funds. The following table contains their ratings in 2003 of the total risk for 29 categories of mutual funds.

<table>
<thead>
<tr>
<th>Total Risk</th>
<th>Number of Funds in category</th>
<th>( \frac{7}{29} = .24 )</th>
<th>( \frac{6}{29} = .21 )</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Below Average</td>
<td>6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Average</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Above Average</td>
<td>6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>High</td>
<td>( \frac{7}{29} )</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

a. Let \( x = 1 \) indicate the low risk category up through \( x = 5 \) for the high risk level. Using this scale, write down the probability distribution for the level of risk.

<table>
<thead>
<tr>
<th>Total Risk</th>
<th>( x )</th>
<th>( f(x) )</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>1</td>
<td>.24</td>
</tr>
<tr>
<td>Below Average</td>
<td>2</td>
<td>.21</td>
</tr>
<tr>
<td>Average</td>
<td>3</td>
<td>.10</td>
</tr>
<tr>
<td>Above Average</td>
<td>4</td>
<td>.21</td>
</tr>
<tr>
<td>High</td>
<td>5</td>
<td>.24</td>
</tr>
</tbody>
</table>

b. Find the expected value of this probability distribution.

\[
\begin{array}{ccc}
\chi & f(x) & \chi f(x) \\
1 & .24 & .24 \\
2 & .21 & .42 \\
3 & .10 & .30 \\
4 & .21 & .84 \\
5 & .24 & 1.20 \\
\end{array}
\]

Expected Value = 3

Typeset by \LaTeX
2. A university found that 80% of its students complete the introductory statistics course. Assume a sample is taken of 10 people. \( n = 10 \)

a. Find the probability exactly 5 will complete the introductory statistics course.

Use table, formula, or calculator.

Formula: \( \binom{10}{5}(0.8)^5(0.2)^5 \approx 0.0264 \)

b. Find the probability that 5 or less will complete the introductory statistics course.

Use table, formula, or calculator. Find \( P(X = 0) + P(X = 1) + P(X = 2) + P(X = 3) + P(X = 4) + P(X = 5) \)

Or use cumulative key on calculator.

\( P(X \leq 5) \approx 0.9328 \)

c. Find the probability that at least 6 will complete the introductory statistics course.

\[ 1 - P(X \leq 5) = P(X \geq 6) \]

\[ P(X \geq 6) \approx 1 - 0.9328 \approx 0.0672 \]

3. Delta Airlines quotes a flight time of 2 hours, 5 minutes for its flights from Cincinnati to Tampa. Suppose we believe that actual flight times are uniformly distributed between 2 hours and 2 hours, 20 minutes.

a. Show the graph of the probability density function for flight time. Make sure to label your graph.

b. What is the probability that the flight will be no more than 5 minutes late?

Flight arrives between 2 hours + 2 hours + 10 minutes

\[ 10 \cdot \frac{1}{20} = 0.5 \]
4. Business Week surveyed MBA alumni 10 years after graduation to find out how much they spend eating out per week. You are asked to conduct a follow-up study by taking a sample of 40 of these MBA alumni. Assume the population standard deviation is $35. \sqrt{n} = 35

\begin{align*}
\bar{x} & \approx 800 \text{ ?} \\
\text{Yes, probably more than 800 alumni w/ MBA.}
\end{align*}

Since \( n = 40 \), the assumptions are only true if the data has no outliers.

b. If the population mean for how much alumni spend is $115.50 per week eating out socially, what is the mean and standard deviation for the sampling distribution of \( \bar{x} \)? \( \mu = 115.50 \)

\[
\begin{align*}
\text{Mean} &= 115.50 \\
\sigma_{\bar{x}} &= \frac{35}{\sqrt{40}} \\
&\approx 5.5340
\end{align*}
\]

c. What is the probability the sample mean will be within $10 of the population mean?

\[
\begin{align*}
\bar{x} &= 105.50 \\
\frac{105.50 - 115.50}{5.5340} &= -1.81 \\
\frac{125.50 - 115.50}{5.5340} &= 1.81
\end{align*}
\]

\[
P(105.50 \leq \bar{x} \leq 125.50) = 0.99298
\]

5. If you draw an M&M candy from a traditional bag of candies, the candy you draw will have one of six colors: brown, red, yellow, green, orange, and blue. The probability of drawing a brown is 0.3, a red is 0.2, a yellow is 0.2, a green is 0.1, and an orange is 0.1.

\[
\frac{3 + 2 + 2 + 1 + 1}{9} = \frac{9}{9} = 1
\]

a. What is the probability of drawing a blue candy?

\[
1 - \frac{9}{9} = 0
\]

b. What is the probability that a M&M candy is either red, orange, or yellow?

\[
\frac{2 + 1 + 2}{9} = \frac{5}{9}
\]

c. What is the probability that a M&M candy is not blue?

\[
\frac{9}{9} = 1
\]
6. Researchers are interested in whether or not taking aspirin affects the incidence of strokes in adults aged 60 or older. They go to some nursing homes and recruit 100 volunteers who keep track of how many aspirin they take each week.

a. Describe the population in a complete sentence. *Adults aged 60 or older.*

b. Describe the sample in a complete sentence. *The 100 volunteers who participating.*

c. What kind of sample is this? *Voluntary.*

d. At the end of three years, the researchers determine who had strokes and compare that to the self-reported amount of aspirin taken by the volunteers. Do the results of this study generalize to all adults aged 60 or older? Explain. *No, because the sample is not random.*

7. In a Gallup poll conducted in December of 2003, 455 of 1011 randomly selected adults aged 18 and older said they had too little time for relaxing or doing nothing.

a. Describe the sampling distribution of \( \bar{p} \). Make sure to indicate what conditions must be satisfied for this sampling distribution.

If \( \frac{n}{N} \leq .05 \), \( np \geq 5 \), and \( n(1-p) \geq 5 \), the sampling distribution for \( \bar{p} \) will be approximately normal with expected value of \( p \) and standard deviation \( \frac{\sqrt{p(1-p)}}{\sqrt{n}} \).

b. Find the point estimate \( \bar{p} \).

\[
\bar{p} = \frac{455}{1011} \approx .45
\]

8. For borrowers with good credit scores, the mean debt for revolving and installment accounts is $15,015. Assume the population standard deviation is $3,540 and that debt amounts are normally distributed. What is the probability that the debt for one randomly selected borrower with good credit is more than $18,000?

\[
Z = \frac{18,000 - 15,015}{3,540} \approx .84
\]

\[
P(\chi > 18,000) = 1 - P(\chi \leq 18,000) = 1 - .7995 = .2005
\]
9. Use the following table to answer the questions for this problem. The data comes from company sales of 800 homes in previous years.

<table>
<thead>
<tr>
<th>Initial Asking Price</th>
<th>Days Listed Until Sold</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Under 30</td>
<td>31-90</td>
</tr>
<tr>
<td>Under $150,000</td>
<td>50</td>
<td>40</td>
</tr>
<tr>
<td>$150,000 - $199,999</td>
<td>20</td>
<td>150</td>
</tr>
<tr>
<td>$200,000 - $250,000</td>
<td>20</td>
<td>280</td>
</tr>
<tr>
<td>Over $250,000</td>
<td>10</td>
<td>30</td>
</tr>
<tr>
<td>Total</td>
<td>100</td>
<td>500</td>
</tr>
</tbody>
</table>

a. If $A$ is defined as the event that a home is listed for more than 90 days before being sold, determine the probability of $A$ from the table above.

$$P(A) = \frac{200}{800} = \frac{1}{4} = 0.25$$

b. If $B$ is defined as the event that the initial asking price is under $150,000, determine the probability of $B$ from the table above.

$$P(B) = \frac{100}{800} = \frac{1}{8} = 0.125$$

c. What is the probability of $A \cap B$?

$$P(A \cap B) = \frac{10}{800} = 0.0125$$

10. You wish to conduct a simple random sample of all the faculty at Cameron University. Assume that there are currently 194 faculty members at Cameron University. You arrange the names of the faculty alphabetically and assign each faculty member a number in order to use the following line from the random number table. What are the numbers of the first three faculty members that you would choose using this line?

16767 30964 23822 96012 94591 65194 50842 53372

**Digit #5's:**

167, 096, 129