Quiz #4 - Solutions

1. Of the 9,945 students enrolled at PSCC this spring, 516 live in Anderson County, 1,744 live in Blount County, 6,236 live in Knox County, 326 live in Loudon County, and 1,123 live in some other county. If one of the students enrolled at PSCC this spring are randomly selected, what is the probability that they live in Blount County? List answer in decimal form rounding to three decimal places if needed.

\[ P(\text{lives in Blount County}) = \frac{1744}{9945} \approx 0.175 = 17.5\% \]

2. A single card is drawn from a standard deck of 52 cards. Find the indicated probabilities in parts (a) through (f).

   a. \( P(\text{ace}) = \frac{4}{52} = \frac{1}{13} \)

   b. \( P(\text{spade}) = \frac{13}{52} = \frac{1}{4} \)

   c. \( P(\text{red card}) = \frac{26}{52} = \frac{1}{2} \)

   d. \( P(\text{ace|black card}) = \frac{2}{26} = \frac{1}{13} \)

   e. \( P(\text{ace or heart}) = \frac{16}{52} = \frac{4}{13} \)

   f. \( P(\text{club|ace}) = \frac{1}{4} \)

3. If two 6-sided dice are rolled, find the following probabilities.

   a. \( P(\text{sum is 5}) = \frac{4}{36} = \frac{1}{9} \)

   b. \( P(\text{sum is more than 5}) = \frac{26}{36} = \frac{13}{18} \)

   c. \( P(\text{at least one die is a 5}) = \frac{11}{36} \)

   d. \( P(\text{at least one die is odd|sum is at most 5}) = \frac{9}{10} \)

4. Look at problems 40 through 47 on page 649. Construct a sample space if spinner B plays spinner D (see Example 7 on page 641 for help).

   \[
   \begin{array}{ccc}
   B \cap D & 1 & 7 & 8 \\
   1 & (1, 1) & (1, 7) & (1, 8) \\
   6 & (6, 1) & (6, 7) & (6, 8) \\
   \end{array}
   \]

   Now what is the probability that each spinner wins.

   \[ P(\text{B wins}) = \frac{1}{6} \quad P(\text{D wins}) = \frac{4}{6} = \frac{2}{3} \]

5. A game is set up as follows: Roll one die. If the result is an odd number you win $6. If the result is a one you win $12. You don’t receive anything for any other roll. How much would it cost to play the game in order to make it a fair game?

   Expected value is

   \[ E = \left( \frac{3}{6} \right)(6) + \left( \frac{1}{6} \right)(12) = 3 + 2 = $5 \]

   Cost to make it a fair game = $5

6. A company holds a contest, and the following prizes are offered: 1 grand prize of $1,000, 2 prizes of $200, and 6 prizes of $50. The contest costs $1 to enter. What is your expected value if 10,000 people (including yourself) enter the contest?

   Expected value =

   \[
   = \frac{1}{10000}(1000) + \frac{2}{10000}(200) + \frac{6}{10000}(50) - 1 = 0.1 + 0.04 + 0.03 - 1 = -$0.83
   \]

\[ 1 \]
Thus, you’re expected to lose 83 cents on the average!

7. Do problem #32 on page 657.

The expected value for playing the game is

\[ E = \left( \frac{1}{2} \right)(2) + \left( \frac{1}{3} \right)(8) + \left( \frac{1}{6} \right)(5) - 5 = -\frac{1}{2} = -\$0.50 \]

Thus, the game is not in your favor since the expectation is negative.

8. Do #6 part (b) on page 703.

List all the years when all three networks had the same percent share: 1965 & 1990

9. Do #10 part (a) on page 704.

How many plan to get a job in national laboratory? 19% of 1,500 = 0.19 \times 1500 = 285

10. Use the multiple-bar graph shown in Example 4 on page 698 to answer parts (a) and (b) below.

a. What was the share of U.S. employment in agriculture in 1899? About 42%

b. Form a conclusion about U.S. employment in manufacturing for the period 1849-2049. Write your conclusion using complete sentences below.

The U.S. employment in manufacturing generally increased from 1849 to 1949. It then decreased from 1949 till 1999, and is predicted to decline through 2049.

11. Use the following set of data to find the mean, median, mode, range, and standard deviation.

\[
\begin{align*}
5 & \quad 11 & \quad 6 & \quad 13 & \quad 5 & \quad 8 \\
\text{mean} & = 8 & \text{median} & = 7 & \text{mode} & = 5 & \text{range} & = 8
\end{align*}
\]

standard deviation \approx 3.3

Show support for your standard deviation calculation below.

<table>
<thead>
<tr>
<th>x</th>
<th>x - \bar{x}</th>
<th>(x - \bar{x})^2</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>3</td>
<td>9</td>
</tr>
<tr>
<td>11</td>
<td>3</td>
<td>9</td>
</tr>
<tr>
<td>6</td>
<td>7</td>
<td>4</td>
</tr>
<tr>
<td>13</td>
<td>8</td>
<td>25</td>
</tr>
<tr>
<td>5</td>
<td>-2</td>
<td>4</td>
</tr>
<tr>
<td>8</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

\[
\sum (x - \bar{x})^2 = 9 + 9 + 4 + 25 + 9 + 0 = 56
\]

n = 6

\[
s = \sqrt{\frac{\sum (x - \bar{x})^2}{n-1}} = \sqrt{\frac{56}{5}} = \sqrt{11.2} \approx 3.3
\]

12. Answer #42 on page 719. Write the letter of your choice here: A

13. Of the mean, median, and mode, which is the most sensitive measure of center? The mean

14. If the standard deviation is zero, what can you say about the set of data? Write your answer below.