SAMPLE MULTIPLE CHOICE PROBLEMS

Part 1: Multiple Choice. Write the letter of the correct solution in the provided space. It is not necessary to show your work.

1. How many distinct words can be made using all the letters in orthopod?
   a) 56   b) 6,720   c) 40,320   d) 175,616   e) none of the other choices

The following should be used for questions 2-5. Supposed two indistinguishable fair dice are tossed and the two numbers that appear are recorded. Let

\[
X = \begin{cases} 
2 & \text{if both of the dice show sixes} \\
1 & \text{if exactly one of the die shows a six} \\
0 & \text{if no six appears}
\end{cases}
\]

Also let

\[
f((n, m)) = \begin{cases} 
\frac{2}{36} & \text{if } n \neq m \\
\frac{1}{36} & \text{if } n = m
\end{cases}
\]

2. The sample space for the experiment has how many sample points?
   a) 2   b) 3   c) 11   d) 21   e) 36

3. \(X\) is
   a) a random variable   b) an event   c) a probability mass function   d) a cumulative distribution function   e) an event function

4. The outcome that both dice are fives is
   a) only a sample point
   b) only an event
   c) neither a sample point nor an event, but a probability mass
   d) both a sample point and an event
   e) none of the above

5. \(f((n, m))\) is
   a) an event function   b) probability mass function of \(X\)   c) a cumulative distribution function   d) \(P(X=(n,m))\)   e) none of the other choices.

6. A closet contains 15 pairs of shoes. In how many ways can you choose 10 shoes so that none comprise a pair?
   a) \(\binom{30}{10}\)   b) \(\binom{15}{10}\)   c) \(2^{10}\)   d) \(\binom{15}{5}\binom{15}{5}\)   e) \(\binom{15}{10}2^{10}\)

7. A bus arrives at your corner randomly between 8:00 and 8:40. You get to the corner at 8:00. What is the probability that you will have to wait less than half an hour?
   a) 30   b) 0.25   c) 0.5   d) 0.75   e) 1
8. Suppose $A$ and $B$ are independent events and $P(A) = 0.2$ and $P(B) = 0.7$.

Which choice is the best approximation to $P(A \cup B)$?

a) 0.15  b) 0.5  c) 0.75  d) 0.9  e) 0.95

9. Suppose $A$ and $B$ are independent events with $P(A) = 0.3$ and $P(B) = 0.4$.

Then $P(AB)$ equals

a) 0  b) 0.12  c) 0.3  d) 0.4  e) 1

10. A discrete random variable takes the values $\{x_1, x_2, x_3, \ldots\}$. Which of the following is a true statement about the probability mass function $p$?

a) $p(x) = 0$ if $x \notin \{x_1, x_2, x_3, \ldots\}$

b) $p$ is right continuous

c) $p$ is nondecreasing

d) $\lim_{x \to \infty} p(x) = 1$

e) a, b, c, and d are all true

Table 1. US 20-24 year olds in 2007

<table>
<thead>
<tr>
<th>Sex</th>
<th>Population</th>
<th>Suicides per 100,000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>10.81 million</td>
<td>20.91</td>
</tr>
<tr>
<td>Female</td>
<td>10.15 million</td>
<td>3.93</td>
</tr>
</tbody>
</table>

11. Let $W = \{\text{US 20-24 year old women in 2007}\}$, $M = \{\text{US 20-24 year old men in 2007}\}$, and $S = \{\text{US 20-24 year old suicide victims in 2007}\}$. Which of the following is the proper interpretation of the upper right entry in Table 1?

a) $P(M|S) = \frac{20.91}{10,810,000}$

b) $P(M|S) = \frac{20.91}{100,000}$

c) $P(SM) = \frac{10,810,000}{20.91}$

d) $P(SM) = \frac{20.91}{100,000}$

e) $P(S|M) = \frac{10,810,000}{20.91}$

f) $P(S|M) = \frac{20.91}{100,000}$

Remark: I could have asked about other probabilities, e.g., $P(M)$ or $P(S)$. 