Practice Test

Key

1. Using the standard normal curve, find the area between \( z = 0 \) and \( z = -2.07 \).
   \[ A = .4808 \]

2. Find the probability for \( P(0 < z < 1.67) \).
   \[ P = .4525 \]

3. What is the area under the standard normal curve between \( z = 1.50 \) and \( z = 2.50 \)?
   \[ A = .0606 \]

4. The average hourly wage of workers at a fast food restaurant is $6.50/hr with a standard deviation of $0.45. Assume that the distribution is normally distributed. If a worker at this fast food restaurant is selected at random, what is the probability that the worker earns more than $6.75?
   \[ P(x > 6.75) \]
   \[ z = \frac{6.75 - 6.50}{0.45} = 0.56 \]
   \[ 0.2912 \times 0.2877 = 0.085 \]

5. What is the \( z \) value to the left of the mean such that 85% of the total area lies to the left of it as shown in Figure 7-7?
   \[ 0.85 - 0.5 = 0.35 \]

6. A recent study found that the average life expectancy of a person living in Africa is 53 years with a standard deviation of 7.5 years. If a person in Africa is selected at random, what is the probability that the person will die before the age of 65?
   \[ P(x < 65) \]
   \[ z = \frac{65 - 53}{7.5} = 1.6 \]
   \[ 0.5 + 0.4452 = 0.9452 \]

7. A survey of 250 lobster fishermen found that they catch an average of 32 pounds of lobster per day with a standard deviation of four pounds. If a random sample of 30 lobster fishermen is selected, what is the probability that their average catch is less than 31.5 pounds?
   \[ P(x < 31.5) \]
   \[ z = \frac{31.5 - 32}{4/\sqrt{30}} = -0.68 \]
   \[ 0.5 - 0.2457 = 0.2483 \]
8. Do the following represent probability distributions? Why or why not?

A.

<table>
<thead>
<tr>
<th>X</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>P(X)</td>
<td>.6</td>
<td>.3</td>
<td>.2</td>
<td>.2</td>
</tr>
</tbody>
</table>

No, Probability = >1

B.

<table>
<thead>
<tr>
<th>X</th>
<th>-1</th>
<th>0</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td>P(X)</td>
<td>.5</td>
<td>.25</td>
<td>.25</td>
</tr>
</tbody>
</table>

Yes, Probability = 1

C.

<table>
<thead>
<tr>
<th>X</th>
<th>17</th>
<th>18</th>
<th>19</th>
<th>20</th>
</tr>
</thead>
<tbody>
<tr>
<td>P(X)</td>
<td>.5</td>
<td>1.2</td>
<td>-.7</td>
<td>0</td>
</tr>
</tbody>
</table>

No, Can't Have - Probability

9. The number of vehicles per household in Wenatchee was studied. The following information was gathered where X is the number of cars:

<table>
<thead>
<tr>
<th>X</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>P(X)</td>
<td>.05</td>
<td>.55</td>
<td>.1</td>
<td>.1</td>
<td>.1</td>
</tr>
</tbody>
</table>

\[ \mu = 2 \]
\[ \sigma^2 = .9 \]
\[ \sigma = .95 \]

Find the mean, variance, and standard deviation for the distribution.

10. In a survey, 58% of American adults said they had never heard of the Internet. If 20 American adults are selected at random, find the probability that exactly 12 will say they have never heard of the Internet. Use the Binomial Probability Formula.

\[ n = 20 \]
\[ x = 12 \]
\[ n C_x p^x q^{n-x} = \binom{20}{12} (.58)^{12} (.42)^{8} = 17.68% \]

11. If I flip a coin 16 times, what's the probability I get fewer than 5 tails. Use the Binomial Probability Formula or the table.

\[ n = 16 \]
\[ p = .5 \]
\[ q = .5 \]

\[ P(X < 5) \]

Use table B, .09591

\[ .002 + .009 + .028 = .039 \]
12. The mean grade point average of the engineering majors at a large university is 3.23 with a standard deviation of 0.72. In a class of 48 students, find the probability that the mean grade point average of the students is less than 3.15.

\[
\mu = 3.23, \quad \sigma = 0.72, \quad z = \frac{3.15 - 3.23}{0.72/\sqrt{48}} = -0.77
\]

\[
P(x < 3.15) = 0.5 - 0.2794 = 0.2206
\]

13. From the question above, what is the probability that a single student selected at random has a GPA less than 3.15.

\[
z = \frac{3.15 - 3.23}{0.72} = -1.1
\]

\[
P(x < 3.15) = 0.5 - 0.38 = 0.12
\]

14. A random sample of 49 female shoppers showed that they spent an average of $23.95 per visit at a grocery store. The standard deviation of the sample was $2.80. Find the 90% confidence interval of the true mean.

\[
\mu < 23.95 + 1.65 \times \frac{2.80}{\sqrt{49}}
\]

\[
23.39 < \mu < 24.61
\]

15. In a certain state, a survey of 500 workers showed that 45% belonged to a union. Find the 95% confidence interval of the true proportion of workers who belong to a union.

\[
0.406 < p < 0.493
\]

16. In a study of 10 insurance sales reps from a certain large city, the average of the group was 48.6 years old and the standard deviation was 4.1 years. Find the 99% confidence interval of the population mean of all insurance sales reps in that city.

\[
\mu < \bar{x} + 3.25 \times \frac{4.1}{\sqrt{10}}
\]

\[
44.39 < \mu < 52.81
\]

17. A club has 50 members. If there is a 10% absentee rate per meeting, find the mean, variance, and standard deviation of the number of people who will be absent from each meeting.

\[
n = 50, \quad p = 0.1, \quad q = 0.9
\]

\[
\mu = np = 50(0.1) = 5
\]

\[
\sigma^2 = npq = 5(0.9) = 4.5
\]

\[
\sigma = 2.12
\]

+ Expected Value
+ Middle/Top 20% …