Identify the given random variable as being discrete or continuous.

1. The cost of a randomly selected orange. **Continuous**
2. The height of a randomly selected student. **Continuous**

Determine whether the following is a probability distribution. If not, identify the requirement that is not satisfied.

3. 

<table>
<thead>
<tr>
<th>x</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>P(x)</td>
<td>0.08</td>
<td>0.19</td>
<td>0.12</td>
<td>0.06</td>
<td>0.55</td>
<td>-0.012</td>
</tr>
</tbody>
</table>

\[ P(x) \neq -0.012 \]

4. A police department reports that the probabilities that 0, 1, 2, 3, and 4 car thefts will be reported in a given day are 0.150, 0.284, 0.270, 0.171, and 0.081, respectively.

\[ \sum P(x) \neq 1 \]

Find the mean of the given probability distribution (*not a binomial distribution*).

5. The number of golf balls ordered by customers of a pro shop has the following prob. distribution

<table>
<thead>
<tr>
<th>x</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>P(x)</td>
<td>.15</td>
<td>.13</td>
<td>.15</td>
<td>.10</td>
<td>.10</td>
<td>.37</td>
</tr>
</tbody>
</table>

\[ \mu = \sum x \cdot P(x) \]

\[ \mu = 3.98 \text{ golf balls} \]
Find the variance of the given probability distribution (not a binomial distribution).

6. The random variable \( x \) is the number of houses sold by a realtor in a single month at the Sendsom's Real Estate office. Its probability distribution is as follows. Find the variance for the probability distribution.

\[
\sigma^2 = \sum [x^2 \cdot P(x)] - \mu^2 \\
\sigma^2 = 19.84 - 3.6^2 \\
\sigma^2 = 6.88
\]

<table>
<thead>
<tr>
<th>( x )</th>
<th>( P(x) )</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0.24</td>
</tr>
<tr>
<td>1</td>
<td>0.01</td>
</tr>
<tr>
<td>2</td>
<td>0.12</td>
</tr>
<tr>
<td>3</td>
<td>0.16</td>
</tr>
<tr>
<td>4</td>
<td>0.01</td>
</tr>
<tr>
<td>5</td>
<td>0.14</td>
</tr>
<tr>
<td>6</td>
<td>0.11</td>
</tr>
<tr>
<td>7</td>
<td>0.21</td>
</tr>
</tbody>
</table>

Find the expected profit of the following. Create a probability distribution.

7. A contractor is considering a sale that promises a profit of $25,000 with a probability of 0.67 or a loss (due to bad weather, strikes, and such) of $12,000 with a probability of 0.33. What is the expected profit?

\[
E(x) = \sum x \cdot P(x)
\]

\[
E(x) = 25,000(0.67) - 12,000(0.33) = 16,750 - 3,960 = 12,790
\]

8. Focus groups of 14 people are randomly selected to discuss products of the Famous Company. It is determined that the mean number (per group) who recognize the Famous brand name is 8.9, and the standard deviation is 0.69. Would is be unusual (outside of 2 standard deviations of the mean) to randomly select 14 people and find that greater than 12 recognize the Famous brand name? Explain.

\[
\mu = 8.9 \quad \text{and} \quad \sigma = 0.69
\]

\[
\mu \pm 2\sigma = 8.9 \pm 2(0.69) = [7.52, 10.28]
\]

Yes, 14 people would be considered unusual because it falls outside of 2 standard deviations of the mean.
Determine whether the given procedure results in a binomial distribution. If not, state the reason why.

___D___ 9. Rolling a single “loaded” die 61 times, keeping track of the number that are rolled.

[A] Not binomial: the trials are not independent.
[B] Not binomial: there are too many trials.
[C] Procedure results in a binomial distribution
[D] Not binomial: there are more than two outcomes for each trial.

Assume that a procedure yields a binomial distribution with a trial repeated \( n \) times. Use the binomial probability formula to find the probability of \( x \) successes given the probability \( p \) of success on a single trial.

10. \( n = 6, x = 3, p = \frac{1}{6} \)

\[
P(3) = \binom{6}{3} \left(\frac{1}{6}\right)^3 \left(\frac{5}{6}\right)^3
\]

\[
P(3) = 5.4\%
\]

11. A company purchases shipments of machine components and uses this acceptance sampling plan: Randomly select and test 24 components and accept the whole batch if there are fewer than 3 defectives. If a particular shipment of thousands of components actually as a 4\% rate of defects, what is the probability that this whole shipment will be accepted?

\[
P(<3) = P(0) + P(1) + P(2)
\]

\[
P(<3) = 0.3754 + 0.3754 + 0.17989
\]

\[
P(<3) = 93.1\%
\]

In the following binomial distribution find the mean and standard deviation.

12. The probability that a person has a tattoo is 0.3. Find the mean and standard deviation of those who have a tattoo in a sample of size 21.

\[
\mu = np = 21(0.3) = 6.3\text{ people will have a tattoo on average}
\]

\[
\sigma^2 = npq = 21(0.3)(0.7) = 4.41
\]

\[
\sigma = \sqrt{\sigma^2} = 2.1:\text{ people with tattoos}
\]