Question No. 1 of 10

**Question**

1. A random variable is a variable whose values depend on ______.
   
   (A) Distributions  
   (B) Chance  
   (C) The mean  
   (D) The variance  
   (E) Continuity

**Feedback**

A. Incorrect!
Think about an example of a random variable – like the numbers that appear on a six-sided die when rolled.

B. Correct!
A random variable is a variable whose values depend on chance.

C. Incorrect!
Think about an example of a random variable – like the numbers that appear on a six-sided die when rolled.

D. Incorrect!
Think about an example of a random variable – like the numbers that appear on a six-sided die when rolled.

E. Incorrect!
Think about an example of a random variable – like the numbers that appear on a six-sided die when rolled.

**Solution**

A random variable is a variable whose values depend on **chance**.

**(B) chance**
### Question 2 of 10

**Instructions:** (1) Read the problem and answer choices carefully (2) Work the problems on paper as needed (3) Pick the answer (4) Go back to review the core concept tutorial as needed.

<table>
<thead>
<tr>
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<th>Feedback</th>
<th>Solution</th>
</tr>
</thead>
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<tr>
<td><strong>2.</strong> Joey is not a very smart student. When he tries to answer a multiple choice question, he always guesses. Suppose that Joey is taking a quiz that has two multiple choice questions on it and that each question has four possible answers – only one of which is correct. Let ( X ) represent the number of correct answers on the quiz. What are the possible values of the random variable ( X )?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(A) 1</td>
<td><strong>A. Incorrect!</strong> Think about how many correct answers Joey might get on the quiz.</td>
<td></td>
</tr>
<tr>
<td>(B) 2</td>
<td><strong>B. Incorrect!</strong> Think about how many correct answers Joey might get on the quiz.</td>
<td></td>
</tr>
<tr>
<td>(C) 0</td>
<td><strong>C. Incorrect!</strong> Think about how many correct answers Joey might get on the quiz.</td>
<td></td>
</tr>
<tr>
<td>(D) 0, 1, 2</td>
<td><strong>D. Correct!</strong> The possible values of the random variable are 0, 1, and 2.</td>
<td></td>
</tr>
<tr>
<td>(E) 1, 2</td>
<td><strong>E. Incorrect!</strong> Think about how many correct answers Joey might get on the quiz.</td>
<td></td>
</tr>
</tbody>
</table>

#### Solution

There are two questions on the quiz and \( X \) represents the number of correctly answer questions. Joey may get no correct answers \( (X = 0) \), one correct answer \( (X = 1) \) or he may be very lucky and get both correct answers \( (X = 2) \). Therefore, \( X \) can be 0, 1, or 2.

\[ (D) \ 0, \ 1, \ 2 \]
Question No. 3 of 10

**Instructions:** (1) Read the problem and answer choices carefully  (2) Work the problems on paper as needed (3) Pick the answer (4) Go back to review the core concept tutorial as needed.

### Question

3. Consider the problem again of Joey taking a quiz that has two multiple choice questions on it and that each question has four possible answers – only one of which is correct. Generate the probability distribution and use it to determine the probability that Joey gets at least 1 correct answer.

   (A) 0.4375  
   (B) 0.5625  
   (C) 0.0625  
   (D) 0.375  
   (E) 0.25

### Feedback

A. Correct! 
The probability of getting at least 1 correct answer is 0.4375.

B. Incorrect!  
Hint: First find P(X=0) and P(X=2). Then use these results to find P(X=1).

C. Incorrect!  
Hint: First find P(X=0) and P(X=2). Then use these results to find P(X=1).

D. Incorrect!  
Hint: First find P(X=0) and P(X=2). Then use these results to find P(X=1).

E. Incorrect!  
Hint: First find P(X=0) and P(X=2). Then use these results to find P(X=1).

### Solution

The probability of getting a correct answer on any individual question is $\frac{1}{4}$ or 0.25 therefore; the probability of getting an incorrect answer on any individual question is $\frac{3}{4}$ or 0.75.

Now $P(X = 0) = P(\text{Incorrect AND Incorrect}) = (0.75)(0.75) = 0.5625$.  
$P(X = 2) = P(\text{Correct AND Correct}) = (0.25)(0.25) = 0.0625$.

By the rule of complements, $P(X = 1) = 1 - (0.5625 + 0.0625) = 0.375$.

Now, $P(\text{At least one correct answer}) = P(X = 1) + P(X = 2) = 0.375 + 0.0625 = 0.4375$.

(A) 0.4375
Question No. 4 of 10

<table>
<thead>
<tr>
<th>Instructions: (1) Read the problem and answer choices carefully (2) Work the problems on paper as needed (3) Pick the answer (4) Go back to review the core concept tutorial as needed.</th>
</tr>
</thead>
<tbody>
<tr>
<td>4. Which of the following is an example of a discrete random variable?</td>
</tr>
<tr>
<td>(A) The amount of water in a glass. (B) The amount of time it takes to walk a mile. (C) The height of a plant. (D) The length of your arm. (E) The number of students in a classroom.</td>
</tr>
</tbody>
</table>

**Question**

<table>
<thead>
<tr>
<th>Feedback</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Incorrect! The amount of water in a glass is a continuous quantity. It must be measured, not counted or listed.</td>
</tr>
<tr>
<td>B. Incorrect! The amount of time it takes to walk a mile is a continuous quantity. It must be measured, not counted or listed.</td>
</tr>
<tr>
<td>C. Incorrect! The height of a plant is a continuous quantity. It must be measured, not counted or listed.</td>
</tr>
<tr>
<td>D. Incorrect! The length of your arm is a continuous quantity. It must be measured, not counted or listed.</td>
</tr>
<tr>
<td>E. Correct! The number of students in a classroom is a discrete quantity. It can be listed or counted.</td>
</tr>
</tbody>
</table>

**Solution**

Remember that discrete means that the quantity can be counted or listed. Of all of the choices, the number of students in a classroom is the only discrete one.

**E) the number of students in a classroom**
Question No. 5 of 10

**Instructions:** (1) Read the problem and answer choices carefully (2) Work the problems on paper as needed (3) Pick the answer (4) Go back to review the core concept tutorial as needed.

<table>
<thead>
<tr>
<th>Question</th>
<th>5. Which of the following is an example of a continuous random variable?</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(A) The number of people in an auditorium.</td>
</tr>
<tr>
<td></td>
<td>(B) The amount of talk-time left on a cell phone.</td>
</tr>
<tr>
<td></td>
<td>(C) The number of products that a particular machine can produce in a day.</td>
</tr>
<tr>
<td></td>
<td>(D) The number of pennies in a penny-bank.</td>
</tr>
<tr>
<td></td>
<td>(E) The number of points taken off of an exam.</td>
</tr>
</tbody>
</table>

**Feedback**

| A. Incorrect! |
The number of people in an auditorium is a discrete quantity. |

| B. Correct! |
The amount of talk-time left on a cell phone is a continuous quantity. It must be measured. |

| C. Incorrect! |
The number of products that a particular machine can produce in a day is a discrete quantity. |

| D. Incorrect! |
The number of pennies in a penny-bank is a discrete quantity. |

| E. Incorrect! |
The number of points taken off of an exam is a discrete quantity. |

**Solution**

Remember that continuous means that the quantity must be measured or spoken of in terms of intervals. Of all of the choices, the amount of talk-time left on a cell phone is the only continuous one.

**(B) the amount of talk-time left on a cell phone**
Question No. 6 of 10

Instructions: (1) Read the problem and answer choices carefully (2) Work the problems on paper as needed (3) Pick the answer (4) Go back to review the core concept tutorial as needed.

6. Calculate the mean of the random variable with the following probability distribution:

<table>
<thead>
<tr>
<th>X</th>
<th>P(X)</th>
</tr>
</thead>
<tbody>
<tr>
<td>-4</td>
<td>0.2</td>
</tr>
<tr>
<td>5</td>
<td>0.2</td>
</tr>
<tr>
<td>6</td>
<td>0.6</td>
</tr>
</tbody>
</table>

(A) 0.6  
(B) 1   
(C) 3.8  
(D) 7   
(E) 3.5

Feedback

A. Incorrect!  
Recall the formula for the mean of a random variable.

B. Incorrect!  
Recall the formula for the mean of a random variable.

C. Correct!  
The mean of the random variable is 3.8.

D. Incorrect!  
Recall the formula for the mean of a random variable.

E. Incorrect!  
Recall the formula for the mean of a random variable.

Solution

The mean is given by \[ \mu = \sum x_i p_i = (-4)(0.2) + (5)(0.2) + (6)(0.6) = 3.8 \] .

(C) 3.8
Question No. 7 of 10

Instructions: (1) Read the problem and answer choices carefully (2) Work the problems on paper as needed (3) Pick the answer (4) Go back to review the core concept tutorial as needed.

<table>
<thead>
<tr>
<th>Question</th>
<th>7. Calculate the variance of the random variable with the following probability distribution:</th>
</tr>
</thead>
</table>
|         | \[
|         | \begin{array}{c|c}
|         | X & P(X) \\
|         | -4 & 0.2 \\
|         | 5  & 0.2 \\
|         | 6  & 0.6 \\
|         | \end{array}
|         | \] |
|         | (A) 12.46                                                                                 |
|         | (B) 15.36                                                                                 |
|         | (C) 13.8                                                                                  |
|         | (D) 11.51                                                                                 |
|         | (E) 31.5                                                                                  |

| Feedback | A. Incorrect!  
Recall the formula for the variance of a random variable. |
|----------|---------------------------------------------------------------------------|
|         | B. Correct!  
The variance of the random variable is 15.36. |
|         | C. Incorrect!  
Recall the formula for the variance of a random variable. |
|         | D. Incorrect!  
Recall the formula for the variance of a random variable. |
|         | E. Incorrect!  
Recall the formula for the variance of a random variable. |

| Solution | The mean (found in the last problem) is \( \mu = 3.8 \). The variance is given by \[
|         | \sigma^2 = \sum(x_i - \mu)^2 \rho_i = (-4 - 3.8)^2(0.2) + (5 - 3.8)^2(0.2) + (6 - 3.8)^2(0.6) = 15.36 .
|         | \] |
|         | (B) 15.36 |

**Question No. 8 of 10**

**Instructions:** (1) Read the problem statement and answer choices carefully (2) Work the problems on paper as needed (3) Pick the answer (4) Go back to review the core concept tutorial as needed.

<table>
<thead>
<tr>
<th>X</th>
<th>P(X)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0.5</td>
</tr>
<tr>
<td>-3</td>
<td>0.4</td>
</tr>
<tr>
<td>0</td>
<td>0.1</td>
</tr>
</tbody>
</table>

8. Calculate the mean of the random variable with the following probability distribution:

(A) -0.7  
(B) 0.7  
(C) -3  
(D) 1  
(E) 0.5

**Feedback**

A. Correct!  
The mean of the random variable is -0.7.

B. Incorrect!  
Recall the formula for the mean of a random variable.

C. Incorrect!  
Recall the formula for the mean of a random variable.

D. Incorrect!  
Recall the formula for the mean of a random variable.

E. Incorrect!  
Recall the formula for the mean of a random variable.

**Solution**

The mean is given by \( \mu = \sum x_i p(x) = (1)(0.5) + (-3)(0.4) + (0)(0.1) = -0.7 \).

(A) -0.7
9. Calculate the variance of the random variable with the following probability distribution:

\[
\begin{array}{c|c}
X & P(X) \\
1 & 0.5 \\
-3 & 0.4 \\
0 & 0.1 \\
\end{array}
\]

(A) 1.9  
(B) 3.61  
(C) 1  
(D) -0.7  
(E) 1.5

A. Incorrect!  
Recall the formula for the variance of a random variable.

B. Correct!  
The mean of the random variable is 3.61.

C. Incorrect!  
Recall the formula for the variance of a random variable.

D. Incorrect!  
Recall the formula for the variance of a random variable.

E. Incorrect!  
Recall the formula for the variance of a random variable.

Solution

The mean (found in the last problem) is \( \mu = -0.7 \). The variance is given by

\[
\sigma^2 = \sum (x_i - \mu)^2 p_i = (1 - [-0.7])^2 (0.5) + (-3 - [-0.7])^2 (0.4) + (0 - [-0.7])^2 (0.1) = 3.61 .
\]

(B) 3.61
**Question 10.** Suppose that $X$ is a random variable with expected value 0.94 that represents the amount on average a gambler can expect to receive for every time he puts a dollar in a slot machine at a casino. (Note that since the expected value is less than $1, the casino wins on average). Suppose that the gambler plays the slot machine 20 times. What is the mean of the random variable $20X$?

(A) $24  
(B) $20  
(C) $94  
(D) $20.2  
(E) $18.8

**Solution**

We know that the mean of $X$ is 0.94. Using the rules for means and variances, the mean of $20X$ is given by $20(0.94) = 18.8$.

(E) $18.8$