Take a guess: A student takes a multiple-choice test that has 10 questions. Each question has four choices. The student guesses randomly at each answer. Let X be the number of questions answered correctly. Round the answers to at least four decimal places.

Part 1 of 2

(a) $P(4) =$ 0.146

Part 2 of 2

(b) $P(\text{More than } 3) =$ 0.2241

Your flight has been delayed: At Denver International Airport, 81% of recent flights have arrived on time. A sample of 14 flights is studied.

Round the probabilities to at least four decimal places.

Part 1 of 4

(a) Find the probability that all 14 of the flights were on time.

The probability that all 14 of the flights were on time is 0.0523.

Part 2 of 4

(b) Find the probability that exactly 12 of the flights were on time.

The probability that exactly 12 of the flights were on time is 0.262.

Part 3 of 4

(c) Find the probability that 12 or more of the flights were on time.

The probability that 12 or more of the flights were on time is 0.4862.

Part: **4 / 4**

Part 4 of 4

(d) Using a cutoff of 0.05, would it be unusual for 13 or more of the flights to be on time?

It would not ▼ be unusual for 13 or more of the flights to be on time since the probability is 0.2242.

Google it: According to a recent report, 67% of internet searches in a particular month used the Google search engine. Assume that a sample of 24 searches is studied. Round the answers to at least four decimal places.

Part 1 of 4

(a) What is the probability that exactly 19 of them used Google?

The probability that exactly 19 of them used Google is 0.0825.

Part 2 of 4

(b) What is the probability that 14 or fewer used Google?

The probability that 14 or fewer used Google is 0.2426.

Part 3 of 4

(c) What is the probability that more than 19 of them used Google?

The probability that more than 19 of them used Google is 0.0634.

Part: **4 / 4**

Part 4 of 4

(d) Using a cutoff of 0.05, would it be unusual if fewer than 12 used Google?

It would ▼ be unusual if fewer than 12 used Google since the probability is 0.0262.

High blood pressure: A national survey reported that 32% of adults in a certain country have hypertension (high blood pressure). A sample of 22 adults is studied.

Part 1 of 2

(a) What is the mean number of adults who have hypertension? Round the answer to two decimal places.

The mean number of adults who have hypertension is 7.04.

Part 2 of 2

(b) What is the standard deviation of the number of adults who have hypertension? Round the answer to four decimal places.

The standard deviation of the number of adults who have hypertension is 2.188.

Stress at work: In a poll about work, 73% of respondents said that their jobs were sometimes or always stressful. Twelve workers are chosen at random. Round the answers to four decimal places.

Part 1 of 4

(a) What is the probability that exactly 11 of them find their jobs stressful?

The probability that exactly 11 of them find their jobs stressful is 0.1016.

Part 2 of 4

(b) What is the probability that more than 9 find their jobs stressful?

The probability that more than 9 find their jobs stressful is 0.3313.

Part 3 of 4

(c) What is the probability that fewer than 6 find their jobs stressful?

The probability that fewer than 6 find their jobs stressful is 0.0219.

Part: **4 / 4**

Part 4 of 4

(d) Using a cutoff of 0.05, would it be unusual if fewer than 5 of them find their jobs stressful?

It would ▼ be unusual if fewer than 5 of them find their jobs stressful, since the probability is 0.0047.

Take a guess: A student takes a multiple-choice test that has 10 questions. Each question has four choices. The student guesses randomly at each answer. Let X be the number of questions answered correctly. Round the answers to at least four decimal places.

Part 1 of 2

(a) $P(4) =$ 0.146

Example

SAMPLE QUESTION

Take a guess: A student takes a multiple-choice test that has 8 questions. Each question has four choices. The student guesses randomly at each answer. Let X be the number of questions answered correctly.

(a) Find $P(3)$.

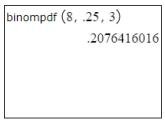
(b) Find $P(\text{More than } 1)$.

EXPLANATION

Each question has four choices so the probability that a student guesses at each answer correctly is 0.25. We have $n = 8$ and $p = 0.25$.

(a) Find $P(3)$.

We will use the TI-84 Plus calculator to find $P(3)$. Press **2nd**, then **VARS** to access the **DISTR** menu. Select **binompdf** and press **ENTER**. In some versions of the TI-84 calculator, a Stats Wizard may appear. If so, enter 8 for the **trials:** field, 0.25 for the **p:** field, and 3 for the **x value:** field, select **Paste** and press **ENTER**. If a Stats Wizard does not appear, on the home screen enter the values for n, p, and x separated by commas, and press **ENTER**.

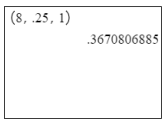


The probability that a student answers exactly 3 questions correctly is $P(3) = 0.2076$.

(b) Find $P(\text{More than } 1)$.

To compute $P(\text{More than } 1)$, we find $P(1 \text{ or fewer})$ and subtract from 1.

We will use the TI-84 Plus calculator to find $P(\text{More than } 1)$. Press **2nd**, then **VARS** to access the **DISTR** menu. Select and press **ENTER**. In some versions of the TI-84 calculator, a Stats Wizard may appear. If so, enter 8 for the **trials:** field, 0.25 for the **p:** field, and 1 for the **x value:** field, select **Paste** and press **ENTER**. If a Stats Wizard does not appear, on the home screen enter the values for n, p, and x separated by commas, and press **ENTER**.



Therefore, $P(1 \text{ or fewer}) = 0.3671$.

We conclude that $P(\text{More than } 1) = 1 - P(1 \text{ or fewer}) = 1 - 0.3671 = 0.6329$.

ANSWER

Part 1 of 2

$P(3) = 0.2076$

Part 2 of 2

$P(\text{More than } 1) = 0.6329$

Your flight has been delayed: At Denver International Airport, 81% of recent flights have arrived on time. A sample of 14 flights is studied.

Round the probabilities to at least four decimal places.

Part 1 of 4

(a) Find the probability that all 14 of the flights were on time.

Example

SAMPLE QUESTION

Your flight has been delayed: At Denver International Airport, 86% of recent flights have arrived on time. A sample of 12 flights is studied.

(a) Find the probability that all 12 of the flights were on time.

(b) Find the probability that exactly 10 of the flights were on time.

(c) Find the probability that 10 or more of the flights were on time.

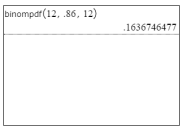
(d) Using a cutoff of 0.05, would it be unusual for 11 or more of the flights to be on time?

EXPLANATION

We have a binomial probability distribution with $n = 12$ trials. The binomial random variable represents the number of flights that were on time. The probability of success p is 0.86. The possible values of X are $0, 1, 2, 3, \ldots, 12$.

(a) Find the probability that all 12 of the flights were on time.

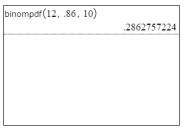
We will use the TI-84 Plus calculator to find $P(12)$. Press **2nd**, then **VARS** to access the **DISTR** menu. Select **binompdf** and press **ENTER**. In some versions of the TI-84 calculator, a Stats Wizard may appear. If so, enter 12 for the **trials:** field, 0.86 for the **p:** field, and 12 for the **x value:** field, select **Paste** and press **ENTER**. If a Stats Wizard does not appear, on the home screen enter the values for n, p, and x separated by commas, and press **ENTER**.



Therefore, $P(12) = 0.1637$.

(b) Find the probability that exactly 10 of the flights were on time.

We will use the TI-84 Plus calculator to find $P(10)$. Press **2nd**, then **VARS** to access the **DISTR** menu. Select **binompdf** and press **ENTER**. In some versions of the TI-84 calculator, a Stats Wizard may appear. If so, enter 12 for the **trials:** field, 0.86 for the **p:** field, and 10 for the **x value:** field, select **Paste** and press **ENTER**. If a Stats Wizard does not appear, on the home screen enter the values for n, p, and x separated by commas, and press **ENTER**.



Therefore, $P(10) = 0.2863$.

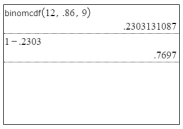
(c) Find the probability that 10 or more of the flights were on time.

We could find the sum of $P(10)$, $P(11)$, and $P(12)$. We can also use the binomcdf function which computes the probability of "less than or equal to."

To compute $P(10 \text{ or more})$, compute $1 - P(9 \text{ or fewer})$.

We will use the TI-84 Plus calculator to find $P(10 \text{ or more})$. Press **2nd**, then **VARS** to access the **DISTR** menu. Select **binomcdf** and press **ENTER**. In some versions of the TI-84 calculator, a Stats Wizard may appear. If so, enter 12 for the **trials:** field, 0.86 for the **p:** field, and 9 for the **x value:** field, select **Paste** and press **ENTER**. If a Stats Wizard does not appear, on the home screen enter the values for n, p, and x separated by commas, and press **ENTER**.

Round the result to four decimal places and subtract from 1, as shown on the screen below.



Therefore, $P(10 \text{ or more}) = 0.7697$.

We conclude that the probability that 10 or more of the flights were on time is 0.7697.

(d) Using a cutoff of 0.05, would it be unusual for 11 or more of the flights to be on time?

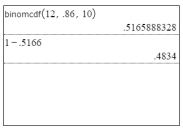
An unusual event is one whose probability is small. The most commonly used cutoff value is 0.05.

We could find the sum of $P(11)$ and $P(12)$. We can also use the binomcdf function which computes the probability of "less than or equal to."

To compute $P(11 \text{ or more})$, compute $1 - P(10 \text{ or fewer})$.

We will use the TI-84 Plus calculator to find $P(11 \text{ or more})$. Press **2nd**, then **VARS** to access the **DISTR** menu. Select **binomcdf** and press **ENTER**. In some versions of the TI-84 calculator, a Stats Wizard may appear. If so, enter 12 for the **trials:** field, 0.86 for the **p:** field, and 10 for the **x value:** field, select **Paste** and press **ENTER**. If a Stats Wizard does not appear, on the home screen enter the values for n, p, and x separated by commas, and press **ENTER**.

Round the result to four decimal places and subtract from 1, as shown on the screen below.



The probability that 11 or more of the flights were on time is 0.4834.

Since the probability is greater than the cutoff, 0.05, the event that 11 or more of the flights were on time is not considered unusual.

ANSWER

Part 1 of 4

The probability that all 12 of the flights were on time is 0.1637.

Part 2 of 4

The probability that exactly 10 of the flights were on time is 0.2863.

Part 3 of 4

The probability that 10 or more of the flights were on time is 0.7697.

Part 4 of 4

It would not be unusual for 11 or more of the flights to be on time since the probability is 0.4834.

High blood pressure: A national survey reported that 32% of adults in a certain country have hypertension (high blood pressure). A sample of 22 adults is studied.

Part 1 of 2

(a) What is the mean number of adults who have hypertension? Round the answer to two decimal places.

The mean number of adults who have hypertension is 7.04

Example

SAMPLE QUESTION

High blood pressure: A national survey reported that 35% of adults in a certain country have hypertension (high blood pressure). A sample of 25 adults is studied.

(a) What is the mean number of adults who have hypertension?

(b) What is the standard deviation of the number of adults who have hypertension?

EXPLANATION

Mean, Variance, and Standard Deviation of a Binomial Random Variable

Let X be a binomial random variable with n trials and success probability p. Then the mean of X is

$$\mu_X = np$$

The variance of X is

$$\sigma_X^2 = np(1-p)$$

The standard deviation of X is

$$\sigma_X = \sqrt{np(1-p)}$$

(a) What is the mean number of adults who have hypertension?

There are $n = 25$ trials, with success probability $p = 0.35$.

The mean is $\mu_X = np = 25(0.35) = 8.75$.

(b) What is the standard deviation of the number of adults who have hypertension?

The standard deviation is $\sigma_X = \sqrt{np(1-p)}$

$= \sqrt{25(0.35)(1-0.35)}$

$= 2.3848$

ANSWER

Part 1 of 2

8.75

Part 2 of 2

2.3848

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