

**#1 Probability & Statistics – Hustle
MA@ National Convention 2026**

Consider the following dataset consisting of 10 single-digit integers:

$$\{0, 3, 5, 4, 8, 3, 8, 7, 8, x\}$$

If the sample mean of the dataset is 5, then what is the value of x ?

Answer : _____

Round 1 2 3 4 5

**#1 Probability & Statistics – Hustle
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$$\{0, 3, 5, 4, 8, 3, 8, 7, 8, x\}$$

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Consider the following dataset consisting of 10 single-digit integers:

$$\{0, 3, 5, 4, 8, 3, 8, 7, 8, x\}$$

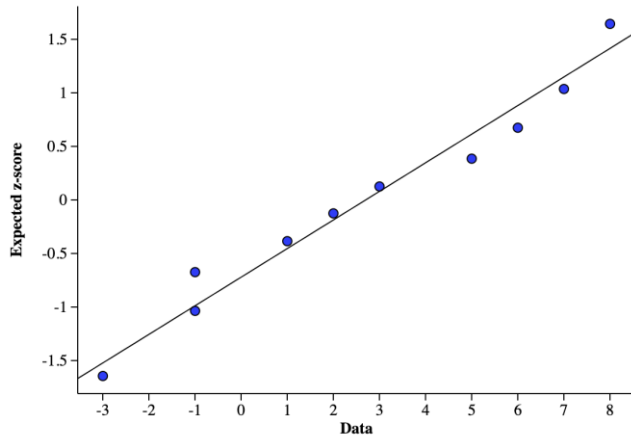
If the sample mean of the dataset is 5, then what is the value of x ?

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Round 1 2 3 4 5

#2 Probability & Statistics – Hustle MA@ National Convention 2026

Consider the following Normal probability plot:



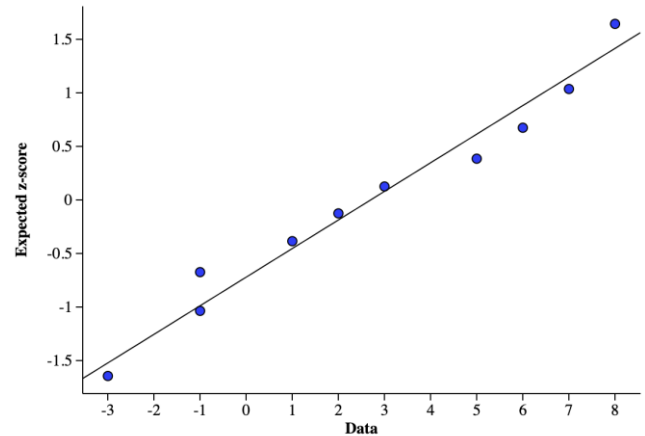
Is it reasonable to assume that the population from which this dataset was drawn is approximately Normal? Answer with either YES or NO.

Answer : _____

Round 1 2 3 4 5

#2 Probability & Statistics – Hustle MA@ National Convention 2026

Consider the following Normal probability plot:



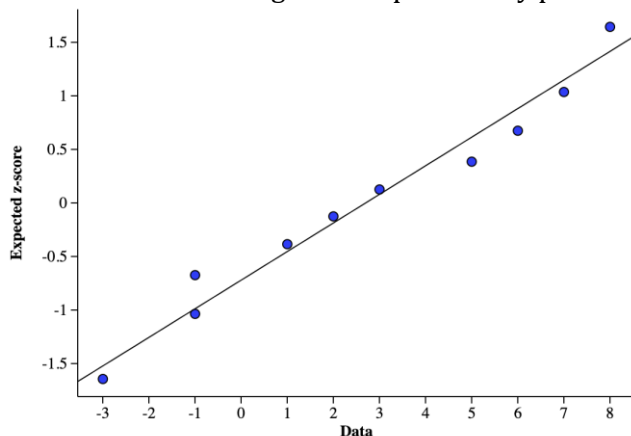
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Consider the following Normal probability plot:



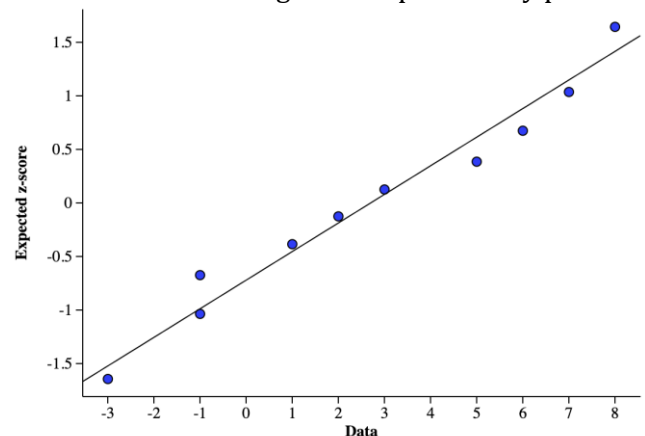
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#2 Probability & Statistics – Hustle MA@ National Convention 2026

Consider the following Normal probability plot:



Is it reasonable to assume that the population from which this dataset was drawn is approximately Normal? Answer with either YES or NO.

Answer : _____

Round 1 2 3 4 5

#3 Probability & Statistics – Hustle MA@ National Convention 2026

Suppose $x_1 = 13$ and $x_2 = 6$ are two random observations that are drawn from a population that is Normally distributed with a mean of μ and a standard deviation of σ . If the two corresponding Z-scores of x_1 and x_2 are $z_1 = 2$ and $z_2 = -1.5$, respectively, then what is $\mu + \sigma$ as an exact value?

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Suppose $x_1 = 13$ and $x_2 = 6$ are two random observations that are drawn from a population that is Normally distributed with a mean of μ and a standard deviation of σ . If the two corresponding Z-scores of x_1 and x_2 are $z_1 = 2$ and $z_2 = -1.5$, respectively, then what is $\mu + \sigma$ as an exact value?

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#4 Probability & Statistics – Hustle
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If A and B are two events such that $P(A) = 0.7$ and $P(B) = 0.6$, find the minimum value of $P(A \text{ and } B)$.

Answer : _____

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#5 Probability & Statistics – Hustle
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Suppose random variables X and Y are two correlated Normal random variables with the same standard deviation of $\sigma_X = \sigma_Y = \sigma$ and a population correlation coefficient between them of $\rho = \frac{\sqrt{3}}{4}$. What is the slope of the population least-squares regression line for determining the mean value of Y for a given value of X ?

Answer : _____

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#6 Probability & Statistics – Hustle
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Suppose a least-squares linear regression analysis scenario for a set of 26 bivariate data observations from explanatory variable, X , and response variable, Y , has the following statistics:

$$\begin{array}{ll} \bar{X} = 20 & \bar{Y} = 15 \\ S_x = 5 & S_y = 4 \end{array}$$

If the y-intercept of the least-squares regression line in this scenario is $a = 30$, then what is the value of the correlation coefficient, r ? Express your final answer as a simplified fraction.

Answer : _____

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If the standard error of the residuals in this scenario is $S_e = \sqrt{2}$, then what is the value of the standard error of the sample slope, $SE(b)$? Express your final answer as an exact simplified value.

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If the standard error of the residuals in this scenario is $S_e = \sqrt{2}$, then what is the sum of the squared residuals? Express your final answer as an exact simplified value.

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#9 Probability & Statistics – Hustle
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Suppose a least-squares linear regression analysis for an SRS of 26 bivariate data observations from explanatory variable, X , and response variable, Y , is conducted. If the explanatory variable and the response variable in this scenario are truly independent, then what is $E(b)$ where b is the sample slope of the least-squares regression line in this scenario? Express your final answer as an exact simplified value.

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Round 1 2 3 4 5

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Suppose a least-squares linear regression analysis for an SRS of 26 bivariate data observations from explanatory variable, X , and response variable, Y , is conducted. If the explanatory variable and the response variable in this scenario are truly independent, then what is $E(b)$ where b is the sample slope of the least-squares regression line in this scenario? Express your final answer as an exact simplified value.

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Round 1 2 3 4 5

#10 Probability & Statistics – Hustle
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Consider the two mutually exclusive events A and B . Calculate the following as an exact value:

$$P(A | B) + P(B | A) + P(A | B^C) + P(B | A^C) + \\ P(A^C | B) + P(B^C | A) + P(A^C | B^C) + P(B^C | A^C)$$

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Round 1 2 3 4 5

#11 Probability & Statistics – Hustle
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Suppose an SRS of size $n = 4$ is drawn from a population of size $N = 10$ and the selections are made without replacement. If the order of the selections does not matter, how many such samples are possible?

Answer : _____

Round 1 2 3 4 5

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#12 Probability & Statistics – Hustle
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Suppose an experiment has two experimental factors where one factor has 3 levels, and the other factor has 4 levels. How many total treatments are there in this experiment?

Answer : _____

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#13 Probability & Statistics – Hustle
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Suppose an experiment has one experimental factor which has 3 levels and one blocking factor which has 4 levels. How many total treatments are there in this experiment?

Answer : _____

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Suppose an experiment has one experimental factor which has 3 levels and one blocking factor which has 4 levels. How many total treatments are there in this experiment?

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Round 1 2 3 4 5

#14 Probability & Statistics – Hustle
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Suppose random variable X is a binomial distribution with $n = 5$ trials and a probability of success of $p = \frac{2}{5}$ for each trial. What is $P(2 \text{ or } 3 \text{ successes})$ as an exact simplified fraction?

Answer : _____

Round 1 2 3 4 5

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Suppose random variable X is a binomial distribution with $n = 5$ trials and a probability of success of $p = \frac{2}{5}$ for each trial. What is $P(2 \text{ or } 3 \text{ successes})$ as an exact simplified fraction?

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Round 1 2 3 4 5

#15 Probability & Statistics – Hustle
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Suppose random variable X is a discrete uniform distribution defined on the sample space consisting of the set $\{1, 2, 3, 4, 5\}$. What is $P(2 \leq X \leq 3)$ as an exact simplified fraction?

Answer : _____

Round 1 2 3 4 5

#15 Probability & Statistics – Hustle
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Suppose random variable X is a discrete uniform distribution defined on the sample space consisting of the set $\{1, 2, 3, 4, 5\}$. What is $P(2 \leq X \leq 3)$ as an exact simplified fraction?

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#16 Probability & Statistics – Hustle
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Suppose random variable X is a binomial distribution with $n = 16$ trials and a probability of success of p for a single trial, and random variable Y is a geometric distribution with the same probability of success, p for a single trial. If $E(X) = E(Y)$, then what is p as an exact simplified fraction?

Answer : _____

Round 1 2 3 4 5

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#17 Probability & Statistics – Hustle
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Suppose random variable X is a binomial distribution with $n = 25$ trials and a probability of success of $p = 0.4$ for a single trial, and random variable Y is a geometric distribution with the same probability of success of $p = 0.4$ for a single trial. If X and Y are independent, then what is $Var(X - Y)$ as an exact simplified value?

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Suppose random variable X is a binomial distribution with $n = 25$ trials and a probability of success of $p = 0.4$ for a single trial, and random variable Y is a geometric distribution with the same probability of success of $p = 0.4$ for a single trial. If X and Y are independent, then what is $Var(X - Y)$ as an exact simplified value?

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#18 Probability & Statistics – Hustle
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Suppose random variable X is a binomial distribution with probability of success $p = 0.2$ for each trial. What is the standard deviation of the sampling distribution of the sample proportion for random samples of size $n = 25$ independent observations from random variable X as an exact simplified value?

Answer : _____

Round 1 2 3 4 5

#18 Probability & Statistics – Hustle
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Suppose random variable X is a binomial distribution with probability of success $p = 0.2$ for each trial. What is the standard deviation of the sampling distribution of the sample proportion for random samples of size $n = 25$ independent observations from random variable X as an exact simplified value?

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#19 Probability & Statistics – Hustle
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Suppose we wish to estimate the unknown mean of a population with a known standard deviation of $\sigma = 15$. What is the exact sample size needed to construct a 95.45% confidence interval using the rounded critical value of $Z^* = 2$ and a desired margin of error of 5?

Answer : _____

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#19 Probability & Statistics – Hustle
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Suppose we wish to estimate the unknown mean of a population with a known standard deviation of $\sigma = 15$. What is the exact sample size needed to construct a 95.45% confidence interval using the rounded critical value of $Z^* = 2$ and a desired margin of error of 5?

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#19 Probability & Statistics – Hustle
MA@ National Convention 2026

Suppose we wish to estimate the unknown mean of a population with a known standard deviation of $\sigma = 15$. What is the exact sample size needed to construct a 95.45% confidence interval using the rounded critical value of $Z^* = 2$ and a desired margin of error of 5?

Answer : _____

Round 1 2 3 4 5

#19 Probability & Statistics – Hustle
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Round 1 2 3 4 5

#20 Probability & Statistics – Hustle MA@ National Convention 2026

Suppose we wish to estimate an unknown population proportion using a 95.45% confidence interval and the rounded critical value of $Z^* = 2$. If $x = 50$ successes are observed in an SRS of $n = 400$ independent observations from the population of interest, then what is the width of the resulting confidence interval as an exact simplified value?

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Round 1 2 3 4 5

#20 Probability & Statistics – Hustle MA@ National Convention 2026

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#21 Probability & Statistics – Hustle
MA® National Convention 2026

Suppose a two-sample t-test of the hypotheses $H_0: \mu_1 = \mu_2$ vs. $H_A: \mu_1 \neq \mu_2$ where all of the conditions are met is conducted using the following statistics taken from the two populations of interest: $\bar{X}_1 = 100$, $\bar{X}_2 = 90$, $n_1 = n_2 = 50$ and $s_1 = s_2 = s$ (i.e., both sample standard deviations are the same). Given that exact value of the resulting test statistic is $t = \frac{5\sqrt{2}}{4}$, what is the exact simplified value of s (the common sample standard deviation of the two samples)?

Answer : _____

Round 1 2 3 4 5

#21 Probability & Statistics – Hustle
MA® National Convention 2026

Suppose a two-sample t-test of the hypotheses $H_0: \mu_1 = \mu_2$ vs. $H_A: \mu_1 \neq \mu_2$ where all of the conditions are met is conducted using the following statistics taken from the two populations of interest: $\bar{X}_1 = 100$, $\bar{X}_2 = 90$, $n_1 = n_2 = 50$ and $s_1 = s_2 = s$ (i.e., both sample standard deviations are the same). Given that exact value of the resulting test statistic is $t = \frac{5\sqrt{2}}{4}$, what is the exact simplified value of s (the common sample standard deviation of the two samples)?

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#23 Probability & Statistics – Hustle
MA@ National Convention 2026

Suppose a two proportion Z-test of the hypotheses $H_0: p_1 = p_2$ vs. $H_A: p_1 \neq p_2$ where all of the conditions are met is conducted and the exact value of the resulting test statistic is $Z = -\frac{5\sqrt{3}}{4}$. If the same exact dataset were analyzed using a chi-square test of association instead, then what is the exact value of the resulting χ^2 test statistic? Answer in the form of a simplified fraction.

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Round 1 2 3 4 5

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#24 Probability & Statistics – Hustle
MA@ National Convention 2026

Suppose we conduct a least-squares linear regression analysis for a set of 62 bivariate data observations from explanatory variable, X , and response variable, Y . If the value of the sample slope is $b = 0.75$ and the standard error of the sample slope in this scenario is $SE(b) = 0.35$, then what is the exact value of the upper bound for a 95% confidence interval for the population least-squares regression line slope when using the rounded critical value of $t^* = 2$? Answer in decimal form.

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#25 Probability & Statistics – Hustle
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Suppose a bag contains 3 red balls, 4 white balls, and 3 blue balls, and 6 balls are randomly drawn from the bag without replacement. What is the probability that exactly two balls of each color are drawn in any order? Answer in the form of a simplified fraction.

Answer : _____

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