#1 Algebra – Hustle
MAΘ National Convention 2023

A quadratic polynomial $f(x)$ has roots 2 and 4. What is the product of the roots of $f(x-1)$?

Answer : _____

Round 1 2 3 4 5

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MAΘ National Convention 2023

A quadratic polynomial $f(x)$ has roots 2 and 4. What is the product of the roots of $f(x-1)$?

Answer : _____

Round 1 2 3 4 5

#2 Algebra – Hustle
MAΘ National Convention 2023

If $3 + \sqrt{2x} = 7$, then find the value of $\sqrt{2x} + x$.

Answer : _____

Round 1 2 3 4 5

#2 Algebra – Hustle
MAΘ National Convention 2023

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Round 1 2 3 4 5

#2 Algebra – Hustle
MAΘ National Convention 2023

If $3 + \sqrt{2x} = 7$, then find the value of $\sqrt{2x} + x$.

Answer : _____

Round 1 2 3 4 5

#3 Algebra – Hustle
MAΘ National Convention 2023

Find the equation of the polynomial, with leading coefficient of 1, whose roots are 2 less than the roots of $f(x) = x^3 - 6x^2 + 5x + 12$.

Answer : ____________________

Round 1 2 3 4 5

#3 Algebra – Hustle
MAΘ National Convention 2023

Find the equation of the polynomial, with leading coefficient of 1, whose roots are 2 less than the roots of $f(x) = x^3 - 6x^2 + 5x + 12$.

Answer : ____________________

Round 1 2 3 4 5

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Answer : ____________________

Round 1 2 3 4 5

#3 Algebra – Hustle
MAΘ National Convention 2023

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Answer : ____________________

Round 1 2 3 4 5

#4 Algebra – Hustle
MAΘ National Convention 2023

Solve for x: $\begin{vmatrix} x-1 & 2 \\ 3 & x-2 \end{vmatrix} = 0$

Answer : _____

Round 1 2 3 4 5

#4 Algebra – Hustle
MAΘ National Convention 2023

Solve for x: $\begin{vmatrix} x-1 & 2 \\ 3 & x-2 \end{vmatrix} = 0$

Answer : _____

Round 1 2 3 4 5

#4 Algebra – Hustle
MAΘ National Convention 2023

Solve for x: $\begin{vmatrix} x-1 & 2 \\ 3 & x-2 \end{vmatrix} = 0$

Answer : _____

Round 1 2 3 4 5

#4 Algebra – Hustle
MAΘ National Convention 2023

Solve for x: $\begin{vmatrix} x-1 & 2 \\ 3 & x-2 \end{vmatrix} = 0$

Answer : _____

Round 1 2 3 4 5

#5 Algebra – Hustle
MAΘ National Convention 2023

Given the equation $6x^2 + 2kx - 8x - 3k = 0$, determine the value of k so that one root is the negative of the other.

Answer : _____

Round 1 2 3 4 5

#5 Algebra – Hustle
MAΘ National Convention 2023

Given the equation $6x^2 + 2kx - 8x - 3k = 0$, determine the value of k so that one root is the negative of the other.

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MAΘ National Convention 2023

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MAΘ National Convention 2023

Given the equation $6x^2 + 2kx - 8x - 3k = 0$, determine the value of k so that one root is the negative of the other.

Answer : _____

Round 1 2 3 4 5

#6 Algebra – Hustle
MAΘ National Convention 2023

If the geometric mean between two numbers, p and q, is 3, and the sum of their squares is 8, then find $(p+q)^2$.

Answer : ____________________

Round 1 2 3 4 5

#6 Algebra – Hustle
MAΘ National Convention 2023

If the geometric mean between two numbers, p and q, is 3, and the sum of their squares is 8, then find $(p+q)^2$.

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Round 1 2 3 4 5

#6 Algebra – Hustle
MAΘ National Convention 2023

If the geometric mean between two numbers, p and q, is 3, and the sum of their squares is 8, then find $(p+q)^2$.

Answer : ____________________

Round 1 2 3 4 5

#7 Algebra – Hustle
MAΘ National Convention 2023

What is the area of the region bounded by $y = \sqrt{4 - x^2}$ and $y = 0$?

Answer : _____

Round 1 2 3 4 5

#7 Algebra – Hustle
MAΘ National Convention 2023

What is the area of the region bounded by $y = \sqrt{4 - x^2}$ and $y = 0$?

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#7 Algebra – Hustle
MAΘ National Convention 2023

What is the area of the region bounded by $y = \sqrt{4 - x^2}$ and $y = 0$?

Answer : _____

Round 1 2 3 4 5

#8 Algebra – Hustle
MAΘ National Convention 2023

If $f(x) = ln(x^2)$, what is/are the y-intercept(s) of the graph of the inverse relation of f?

Answer : _____

Round 1 2 3 4 5

#8 Algebra – Hustle
MAΘ National Convention 2023

If $f(x) = ln(x^2)$, what is/are the y-intercept(s) of the graph of the inverse relation of f?

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MAΘ National Convention 2023

If $f(x) = ln(x^2)$, what is/are the y-intercept(s) of the graph of the inverse relation of f?

Answer : _____

Round 1 2 3 4 5

#9 Algebra – Hustle
MAΘ National Convention 2023

If $a + \frac{1}{a} = 3$, find $\left|a - \frac{1}{a}\right|$.

Answer : ______________________

Round 1 2 3 4 5

#9 Algebra – Hustle
MAΘ National Convention 2023

If $a + \frac{1}{a} = 3$, find $\left|a - \frac{1}{a}\right|$.

Answer : ______________________

Round 1 2 3 4 5

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MAΘ National Convention 2023

If $a + \frac{1}{a} = 3$, find $\left|a - \frac{1}{a}\right|$.

Answer : ______________________

Round 1 2 3 4 5

#9 Algebra – Hustle
MAΘ National Convention 2023

If $a + \frac{1}{a} = 3$, find $\left|a - \frac{1}{a}\right|$.

Answer : ______________________

Round 1 2 3 4 5

#10 Algebra – Hustle
MAΘ National Convention 2023

If $\frac{x+5}{2(x-1)} - \frac{Ax+B}{x^2+x-2} + \frac{C}{4} = \frac{5x+14}{4(x+2)}$ then find $A + B + C$.

Answer : _____

Round 1 2 3 4 5

#10 Algebra – Hustle
MAΘ National Convention 2023

If $\frac{x+5}{2(x-1)} - \frac{Ax+B}{x^2+x-2} + \frac{C}{4} = \frac{5x+14}{4(x+2)}$ then find $A + B + C$.

Answer : _____

Round 1 2 3 4 5

#10 Algebra – Hustle
MAΘ National Convention 2023

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Answer : _____

Round 1 2 3 4 5

#10 Algebra – Hustle
MAΘ National Convention 2023

If $\frac{x+5}{2(x-1)} - \frac{Ax+B}{x^2+x-2} + \frac{C}{4} = \frac{5x+14}{4(x+2)}$ then find $A + B + C$.

Answer : _____

Round 1 2 3 4 5

#11 Algebra – Hustle
MAΘ National Convention 2023

How many asymptotes does the graph of the function $y = \frac{3}{x^2-5x-24}$ have?

Answer : _____

Round 1 2 3 4 5

#11 Algebra – Hustle
MAΘ National Convention 2023

How many asymptotes does the graph of the function $y = \frac{3}{x^2-5x-24}$ have?

Answer : _____

Round 1 2 3 4 5

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Round 1 2 3 4 5

#11 Algebra – Hustle
MAΘ National Convention 2023

How many asymptotes does the graph of the function $y = \frac{3}{x^2-5x-24}$ have?

Answer : _____

Round 1 2 3 4 5

#12 Algebra – Hustle
MAΘ National Convention 2023

Find the area enclosed by the graph of $|x| + |y| = a$ in terms of a, given $a > 0$.

Answer : ____________________

Round 1 2 3 4 5

#12 Algebra – Hustle
MAΘ National Convention 2023

Find the area enclosed by the graph of $|x| + |y| = a$ in terms of a, given $a > 0$.

Answer : ____________________

Round 1 2 3 4 5

#12 Algebra – Hustle
MAΘ National Convention 2023

Find the area enclosed by the graph of $|x| + |y| = a$ in terms of a, given $a > 0$.

Answer : ____________________

Round 1 2 3 4 5

#12 Algebra – Hustle
MAΘ National Convention 2023

Find the area enclosed by the graph of $|x| + |y| = a$ in terms of a, given $a > 0$.

Answer : ____________________

Round 1 2 3 4 5

#13 Algebra – Hustle
MAΘ National Convention 2023

Evaluate $\sum_{n=0}^{\infty}\left(\frac{3}{4}\right)^n(-1)^n$.

Answer : _____

Round 1 2 3 4 5

#13 Algebra – Hustle
MAΘ National Convention 2023

Evaluate $\sum_{n=0}^{\infty}\left(\frac{3}{4}\right)^n(-1)^n$.

Answer : _____

Round 1 2 3 4 5

#13 Algebra – Hustle
MAΘ National Convention 2023

Evaluate $\sum_{n=0}^{\infty}\left(\frac{3}{4}\right)^n(-1)^n$.

Answer : _____

Round 1 2 3 4 5

#13 Algebra – Hustle
MAΘ National Convention 2023

Evaluate $\sum_{n=0}^{\infty}\left(\frac{3}{4}\right)^n(-1)^n$.

Answer : _____

Round 1 2 3 4 5

#14 Algebra – Hustle
MAΘ National Convention 2023

Find all values of m which will make $x+2$ a factor of $x^3+3m^2x^2+mx+4=0$.

Answer : ____________________

Round 1 2 3 4 5

#14 Algebra – Hustle
MAΘ National Convention 2023

Find all values of m which will make $x+2$ a factor of $x^3+3m^2x^2+mx+4=0$.

Answer : ____________________

Round 1 2 3 4 5

#14 Algebra – Hustle
MAΘ National Convention 2023

Find all values of m which will make $x+2$ a factor of $x^3+3m^2x^2+mx+4=0$.

Answer : ____________________

Round 1 2 3 4 5

#14 Algebra – Hustle
MAΘ National Convention 2023

Find all values of m which will make $x+2$ a factor of $x^3+3m^2x^2+mx+4=0$.

Answer : ____________________

Round 1 2 3 4 5

#15 Algebra – Hustle
MAΘ National Convention 2023

Two cars are 3000 feet apart and drive directly toward each other at 40 feet per minute and 20 feet per minute, respectively. Assuming constant speeds, in how many minutes will the cars meet?

Answer : ____________________

Round 1 2 3 4 5

#15 Algebra – Hustle
MAΘ National Convention 2023

Two cars are 3000 feet apart and drive directly toward each other at 40 feet per minute and 20 feet per minute, respectively. Assuming constant speeds, in how many minutes will the cars meet?

Answer : ____________________

Round 1 2 3 4 5

#15 Algebra – Hustle
MAΘ National Convention 2023

Two cars are 3000 feet apart and drive directly toward each other at 40 feet per minute and 20 feet per minute, respectively. Assuming constant speeds, in how many minutes will the cars meet?

Answer : ____________________

Round 1 2 3 4 5

#15 Algebra – Hustle
MAΘ National Convention 2023

Two cars are 3000 feet apart and drive directly toward each other at 40 feet per minute and 20 feet per minute, respectively. Assuming constant speeds, in how many minutes will the cars meet?

Answer : ____________________

Round 1 2 3 4 5

#16 Algebra – Hustle
MAΘ National Convention 2023

If $f(x) = \frac{x}{x+1}$, find $f^{-1}(x)$ (the inverse function of f).

Answer : _____

Round 1 2 3 4 5

#16 Algebra – Hustle
MAΘ National Convention 2023

If $f(x) = \frac{x}{x+1}$, find $f^{-1}(x)$ (the inverse function of f).

Answer : _____

Round 1 2 3 4 5

#16 Algebra – Hustle
MAΘ National Convention 2023

If $f(x) = \frac{x}{x+1}$, find $f^{-1}(x)$ (the inverse function of f).

Answer : _____

Round 1 2 3 4 5

#16 Algebra – Hustle
MAΘ National Convention 2023

If $f(x) = \frac{x}{x+1}$, find $f^{-1}(x)$ (the inverse function of f).

Answer : _____

Round 1 2 3 4 5

#17 Algebra – Hustle
MAΘ National Convention 2023

If $x + y + z = 5$, $x + y - z = 7$, and $(x - y)^3 + (y - z)^3 = (x - z)^3$ is a system with solution (x, y, z), find $3x + y - z$.

Answer : _____

Round 1 2 3 4 5

#17 Algebra – Hustle
MAΘ National Convention 2023

If $x + y + z = 5$, $x + y - z = 7$, and $(x - y)^3 + (y - z)^3 = (x - z)^3$ is a system with solution (x, y, z), find $3x + y - z$.

Answer : _____

Round 1 2 3 4 5

#17 Algebra – Hustle
MAΘ National Convention 2023

If $x + y + z = 5$, $x + y - z = 7$, and $(x - y)^3 + (y - z)^3 = (x - z)^3$ is a system with solution (x, y, z), find $3x + y - z$.

Answer : _____

Round 1 2 3 4 5

#17 Algebra – Hustle
MAΘ National Convention 2023

If $x + y + z = 5$, $x + y - z = 7$, and $(x - y)^3 + (y - z)^3 = (x - z)^3$ is a system with solution (x, y, z), find $3x + y - z$.

Answer : _____

Round 1 2 3 4 5

#18 Algebra – Hustle
MAΘ National Convention 2023

Find the radius of the circle with equation
$3x^2 + 6x + 3y^2 - y = \frac{107}{12}$.

Answer : ____________________

Round 1 2 3 4 5

#18 Algebra – Hustle
MAΘ National Convention 2023

Find the radius of the circle with equation
$3x^2 + 6x + 3y^2 - y = \frac{107}{12}$.

Answer : ____________________

Round 1 2 3 4 5

#18 Algebra – Hustle
MAΘ National Convention 2023

Find the radius of the circle with equation
$3x^2 + 6x + 3y^2 - y = \frac{107}{12}$.

Answer : ____________________

Round 1 2 3 4 5

#18 Algebra – Hustle
MAΘ National Convention 2023

Find the radius of the circle with equation
$3x^2 + 6x + 3y^2 - y = \frac{107}{12}$.

Answer : ____________________

Round 1 2 3 4 5

#19 Algebra – Hustle
MAΘ National Convention 2023

Find the sum of all values of x such that $|x + 5| = |2x - 7|$.

Answer : _____

Round 1 2 3 4 5

#19 Algebra – Hustle
MAΘ National Convention 2023

Find the sum of all values of x such that $|x + 5| = |2x - 7|$.

Answer : _____

Round 1 2 3 4 5

#19 Algebra – Hustle
MAΘ National Convention 2023

Find the sum of all values of x such that $|x + 5| = |2x - 7|$.

Answer : _____

Round 1 2 3 4 5

#19 Algebra – Hustle
MAΘ National Convention 2023

Find the sum of all values of x such that $|x + 5| = |2x - 7|$.

Answer : _____

Round 1 2 3 4 5

#20 Algebra – Hustle
MAΘ National Convention 2023

Find the length of the conjugate axis of the graph of $x^2 - 4y^2 + 10x + 24y + 25 = 0$.

Answer : _____

Round 1 2 3 4 5

#20 Algebra – Hustle
MAΘ National Convention 2023

Find the length of the conjugate axis of the graph of $x^2 - 4y^2 + 10x + 24y + 25 = 0$.

Answer : _____

Round 1 2 3 4 5

#20 Algebra – Hustle
MAΘ National Convention 2023

Find the length of the conjugate axis of the graph of $x^2 - 4y^2 + 10x + 24y + 25 = 0$.

Answer : _____

Round 1 2 3 4 5

#20 Algebra – Hustle
MAΘ National Convention 2023

Find the length of the conjugate axis of the graph of $x^2 - 4y^2 + 10x + 24y + 25 = 0$.

Answer : _____

Round 1 2 3 4 5

#21 Algebra – Hustle
MAΘ National Convention 2023

Solve for x if

$$log_4(x-2) + log_4(2x-3) = 2\,log_4\,x.$$

Answer : _____

Round 1 2 3 4 5

#21 Algebra – Hustle
MAΘ National Convention 2023

Solve for x if

$$log_4(x-2) + log_4(2x-3) = 2\,log_4\,x.$$

Answer : _____

Round 1 2 3 4 5

#21 Algebra – Hustle
MAΘ National Convention 2023

Solve for x if

$$log_4(x-2) + log_4(2x-3) = 2\,log_4\,x.$$

Answer : _____

Round 1 2 3 4 5

#21 Algebra – Hustle
MAΘ National Convention 2023

Solve for x if

$$log_4(x-2) + log_4(2x-3) = 2\,log_4\,x.$$

Answer : _____

Round 1 2 3 4 5

#22 Algebra – Hustle
MAΘ National Convention 2023

Find the domain of $f(x)$ below, express your answer in interval notation.

$$f(x) = 2^x \log(x^2 - 8x + 15)$$

Answer : _____

Round 1 2 3 4 5

#22 Algebra – Hustle
MAΘ National Convention 2023

Find the domain of $f(x)$ below, express your answer in interval notation.

$$f(x) = 2^x \log(x^2 - 8x + 15)$$

Answer : _____

Round 1 2 3 4 5

#22 Algebra – Hustle
MAΘ National Convention 2023

Find the domain of $f(x)$ below, express your answer in interval notation.

$$f(x) = 2^x \log(x^2 - 8x + 15)$$

Answer : _____

Round 1 2 3 4 5

#22 Algebra – Hustle
MAΘ National Convention 2023

Find the domain of $f(x)$ below, express your answer in interval notation.

$$f(x) = 2^x \log(x^2 - 8x + 15)$$

Answer : _____

Round 1 2 3 4 5

#23 Algebra – Hustle
MAΘ National Convention 2023

If $a^2 + 10b = -34$ and $b^2 - 8a = -7$, what is the value of $a + b$ for real values a and b?

Answer : _____

Round 1 2 3 4 5

#23 Algebra – Hustle
MAΘ National Convention 2023

If $a^2 + 10b = -34$ and $b^2 - 8a = -7$, what is the value of $a + b$ for real values a and b?

Answer : _____

Round 1 2 3 4 5

#23 Algebra – Hustle
MAΘ National Convention 2023

If $a^2 + 10b = -34$ and $b^2 - 8a = -7$, what is the value of $a + b$ for real values a and b?

Answer : _____

Round 1 2 3 4 5

#23 Algebra – Hustle
MAΘ National Convention 2023

If $a^2 + 10b = -34$ and $b^2 - 8a = -7$, what is the value of $a + b$ for real values a and b?

Answer : _____

Round 1 2 3 4 5

#24 Algebra – Hustle
MAΘ National Convention 2023

Find the remainder when

$$f(x) = x^{2000} - 2x^{1999} + 3x^{1998} - 4x^{1997} + \ldots + 1999x^2 - 2000x + 1$$

is divided by $(x+1)$.

Answer : _____

Round 1 2 3 4 5

#24 Algebra – Hustle
MAΘ National Convention 2023

Find the remainder when

$$f(x) = x^{2000} - 2x^{1999} + 3x^{1998} - 4x^{1997} + \ldots + 1999x^2 - 2000x + 1$$

is divided by $(x+1)$.

Answer : _____

Round 1 2 3 4 5

#24 Algebra – Hustle
MAΘ National Convention 2023

Find the remainder when

$$f(x) = x^{2000} - 2x^{1999} + 3x^{1998} - 4x^{1997} + \ldots + 1999x^2 - 2000x + 1$$

is divided by $(x+1)$.

Answer : _____

Round 1 2 3 4 5

#24 Algebra – Hustle
MAΘ National Convention 2023

Find the remainder when

$$f(x) = x^{2000} - 2x^{1999} + 3x^{1998} - 4x^{1997} + \ldots + 1999x^2 - 2000x + 1$$

is divided by $(x+1)$.

Answer : _____

Round 1 2 3 4 5

#25 Algebra – Hustle
MAΘ National Convention 2023

Cramer's Rule is used to solve a system of equations with variables x, y in that order. The y-value is solved with the expression

$$\frac{\begin{vmatrix} -1 & 3 \\ -4 & 6 \end{vmatrix}}{\begin{vmatrix} -1 & -2 \\ -4 & 9 \end{vmatrix}}$$

What is the value of x in the same system of equations?

Answer : _____

Round 1 2 3 4 5

#25 Algebra – Hustle
MAΘ National Convention 2023

Cramer's Rule is used to solve a system of equations with variables x, y in that order. The y-value is solved with the expression

$$\frac{\begin{vmatrix} -1 & 3 \\ -4 & 6 \end{vmatrix}}{\begin{vmatrix} -1 & -2 \\ -4 & 9 \end{vmatrix}}$$

What is the value of x in the same system of equations?

Answer : _____

Round 1 2 3 4 5

#25 Algebra – Hustle
MAΘ National Convention 2023

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What is the value of x in the same system of equations?

Answer : _____

Round 1 2 3 4 5

#25 Algebra – Hustle
MAΘ National Convention 2023

Cramer's Rule is used to solve a system of equations with variables x, y in that order. The y-value is solved with the expression

$$\frac{\begin{vmatrix} -1 & 3 \\ -4 & 6 \end{vmatrix}}{\begin{vmatrix} -1 & -2 \\ -4 & 9 \end{vmatrix}}$$

What is the value of x in the same system of equations?

Answer : _____

Round 1 2 3 4 5