#1 Algebra - Hustle	
MA® National Convention	2023

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

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Answer	

Round 1 2 3 4 5

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Round 1 2 3 4 5

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Round 1 2 3 4 5

#2 Algebra - Hustle	
<b>MA® National Convention</b>	2023

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

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Round 1 2 3 4 5

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Answer : \_\_\_\_\_

Answer : \_\_\_\_\_

Round 1 2 3 4 5

#### #3 Algebra - Hustle MA⊕ National Convention 2023

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

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Round 1 2 3 4 5

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Round 1 2 3 4 5

Answer : \_\_\_\_\_

# #4 Algebra – Hustle MA⊖ National Convention 2023

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

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Answer : \_\_\_\_\_

#### Round 1 2 3 4 5

# #4 Algebra - Hustle

MA© National Convention 2023  
Solve for 
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Answer : \_\_\_\_\_

Round 1 2 3 4 5

Answer : \_\_\_\_\_

#5	Algebra - Hustle	
MA	Mational 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.

# **#5 Algebra - Hustle** MA® 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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Answer	

Round 1 2 3 4 5

# #5 Algebra - Hustle

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Answer : \_\_\_\_\_

Round 1 2 3 4 5

# #5 Algebra - Hustle

MA© 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 : \_\_\_\_\_

Answer : \_\_\_\_\_

Round 1 2 3 4 5

#### #6 Algebra - Hustle MA© 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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Answer	-	

Round 1 2 3 4 5

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Round 1 2 3 4 5

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# #7 Algebra – Hustle MA⊕ National Convention 2023

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#8 Algebra – Hustle	
MAO National Convention	2023

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Round 1 2 3 4 5

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Round 1 2 3 4 5

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

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Answer : \_\_\_\_\_

Round 1 2 3 4 5

#9 Algebra - Hustle MA® National Convention 2023

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Round 1 2 3 4 5

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Round 1 2 3 4 5

Answer : \_\_\_\_\_

# #10 Algebra – Hustle MA⊕ 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  $A+B+C$ .

#### #10 Algebra - Hustle MA⊕ National Convention 2023

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Ancwar	
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Round 1 2 3 4 5

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Round 1 2 3 4 5

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Answer : \_\_\_\_\_

Round 1 2 3 4 5

Answer : \_\_\_\_\_

## #11 Algebra - Hustle MA⊕ National Convention 2023

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

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Round 1 2 3 4 5

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#12 Algebra -	Hustle	
MAO National	Convention	2023

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

# #12 Algebra – Hustle MA® National Convention 2023

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Answer :			
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	answei	:	

Round 1 2 3 4 5

# #12 Algebra – Hustle MA© National Convention 2023

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Answer : \_\_\_\_\_

Round 1 2 3 4 5

# #12 Algebra – Hustle MA⊕ National Convention 2023

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

Answer : \_\_\_\_\_

Answer : \_\_\_\_\_

Round 1 2 3 4 5

# #13 Algebra - Hustle MA⊕ National Convention 2023

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

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Round 1 2 3 4 5

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Round 1 2 3 4 5

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Answer : \_\_\_\_\_

Round 1 2 3 4 5

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#### #14 Algebra – Hustle MA⊕ National Convention 2023

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

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Round 1 2 3 4 5

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Round 1 2 3 4 5

#### #15 Algebra – Hustle MA⊕ 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?

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	answei	:	

Round 1 2 3 4 5

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Round 1 2 3 4 5

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Answer : \_\_\_\_\_

Round 1 2 3 4 5

Answer : \_\_\_\_\_

# #16 Algebra – Hustle MA@ National Convention 2023

**MAO National Convention 2023** If  $f(x) = \frac{x}{x+1}$ , find  $f^{-1}(x)$  (the inverse function of f).

# #16 Algebra – Hustle MA® National Convention 2023

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Round 1 2 3 4 5

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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 MA⊕ National Convention 2023

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

Answer : \_\_\_\_\_\_

Answer : \_\_\_\_\_\_

Round 1 2 3 4 5

#### #17 Algebra - Hustle MA⊕ 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.

#### #17 Algebra - Hustle MA⊖ 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.

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Answer : \_\_\_\_\_

Round 1 2 3 4 5

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Answer : \_\_\_\_\_

Answer : \_\_\_\_\_

Round 1 2 3 4 5

# #18 Algebra - Hustle MA⊕ National Convention 2023

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

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Round 1 2 3 4 5

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Answer : \_\_\_\_\_

Round 1 2 3 4 5

#### #18 Algebra - Hustle MA⊕ 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

Answer : \_\_\_\_\_

#### #19 Algebra - Hustle MA⊕ National Convention 2023

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

#### #19 Algebra – Hustle MA⊕ National Convention 2023

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Round 1 2 3 4 5

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Round 1 2 3 4 5

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Answer : \_\_\_\_\_

Round 1 2 3 4 5

Answer : \_\_\_\_\_

# #20 Algebra – Hustle MA© National Convention 2023

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

# #20 Algebra - Hustle MA© National Convention 2023

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

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Round 1 2 3 4 5

# #20 Algebra – Hustle MA⊕ National Convention 2023

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Answer : \_\_\_\_\_

Round 1 2 3 4 5

# #20 Algebra - Hustle MA⊕ 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

Answer : \_\_\_\_\_

## #21 Algebra – Hustle MA⊕ National Convention 2023

Solve for x if

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

#### #21 Algebra – Hustle MA⊕ National Convention 2023

Solve for x if

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Answer : \_\_\_\_\_\_

Round 1 2 3 4 5

#21 Algebra - Hustle MA⊕ 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 MA® 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

Answer : \_\_\_\_\_

# #22 Algebra – Hustle MA© National Convention 2023

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

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

#### #22 Algebra – Hustle MA© National Convention 2023

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Round 1 2 3 4 5

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Answer : \_\_\_\_\_

Round 1 2 3 4 5

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

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Answer : \_\_\_\_\_

Round 1 2 3 4 5

Answer : \_\_\_\_\_

# #23 Algebra – Hustle MA⊕ 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?

#### #23 Algebra – Hustle MA⊕ 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 :			
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Round 1 2 3 4 5

#### #23 Algebra – Hustle MA© National Convention 2023

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Round 1 2 3 4 5

#### #23 Algebra – Hustle MA⊕ National Convention 2023

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Answer : \_\_\_\_\_

Answer : \_\_\_\_\_

Round 1 2 3 4 5

#### #24 Algebra – Hustle MA⊕ National Convention 2023

# Find the remainder when $f(x) = x^{2000} - 2x^{1999} + 3x^{1998} - 4x^{1997} + \dots$ $\dots + 1999x^2 - 2000x + 1$ is divided by (x+1).

#24 Alge	bra – H	lustle		
MA@ Nati	ional C	onvent	tion	2023

Find the remainder when  $f(x) = x^{2000} - 2x^{1999} + 3x^{1998} - 4x^{1997} + \dots$  $\dots + 1999x^2 - 2000x + 1$  is divided by (x+1).

Answer	:	
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Round 1 2 3 4 5

#### #24 Algebra - Hustle MA⊕ National Convention 2023

Find the remainder when  $f(x) = x^{2000} - 2x^{1999} + 3x^{1998} - 4x^{1997} + \dots$  $\dots + 1999x^2 - 2000x + 1$  is divided by (x+1).

Answer : \_\_\_\_\_\_

Round 1 2 3 4 5

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Find the remainder when  $f(x) = x^{2000} - 2x^{1999} + 3x^{1998} - 4x^{1997} + \dots$  $\dots + 1999x^2 - 2000x + 1$  is divided by (x+1).

Answer : \_\_\_\_\_

Round 1 2 3 4 5

Answer : \_\_\_\_\_

#### #25 Algebra – Hustle MA© 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

$$\begin{array}{c|cccc}
 & -1 & 3 \\
 & -4 & 6 \\
\hline
 & -1 & -2 \\
 & -4 & 9
\end{array}$$

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

Answer : \_\_\_\_\_

Round 1 2 3 4 5

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Round 1 2 3 4 5

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Round 1 2 3 4 5

Answer : \_\_\_\_\_