#1 Algebra – Hustle
MAΘ National Convention 2016

Let $x+y=11$ and $x^2+y^2=325$. What is the value of x^3+y^3?

Answer : _____

Round 1 2 3 4 5

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MAΘ National Convention 2016

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Answer : _____

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MAΘ National Convention 2016

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Answer : _____

Round 1 2 3 4 5

#2 Algebra – Hustle
MAΘ National Convention 2016

The sum of two numbers is 20, and the product of the two numbers is -15. Find the sum of the reciprocals of the two numbers.

Answer : _____

Round 1 2 3 4 5

#2 Algebra – Hustle
MAΘ National Convention 2016

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MAΘ National Convention 2016

The sum of two numbers is 20, and the product of the two numbers is -15. Find the sum of the reciprocals of the two numbers.

Answer : _____

Round 1 2 3 4 5

#3 Algebra – Hustle
MAΘ National Convention 2016

Find the distance between the foci of the conic section whose graph has equation $4x^2+9y^2+24x+72y+144=0$.

Answer : _____

Round 1 2 3 4 5

#3 Algebra – Hustle
MAΘ National Convention 2016

Find the distance between the foci of the conic section whose graph has equation $4x^2+9y^2+24x+72y+144=0$.

Answer : _____

Round 1 2 3 4 5

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MAΘ National Convention 2016

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Round 1 2 3 4 5

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MAΘ National Convention 2016

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Answer : _____

Round 1 2 3 4 5

#4 Algebra – Hustle
MAΘ National Convention 2016

In how many ways can eight MAΘ people line up for a photograph if two of those people, Kay and Thom, are side by side?

Answer : _____

Round 1 2 3 4 5

#4 Algebra – Hustle
MAΘ National Convention 2016

In how many ways can eight MAΘ people line up for a photograph if two of those people, Kay and Thom, are side by side?

Answer : _____

Round 1 2 3 4 5

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Round 1 2 3 4 5

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In how many ways can eight MAΘ people line up for a photograph if two of those people, Kay and Thom, are side by side?

Answer : _____

Round 1 2 3 4 5

#5 Algebra – Hustle
MAΘ National Convention 2016

For what value of c will $2x^3 - 5x^2 + cx + 6$ leave a remainder of 98 when divided by $x - 4$?

Answer : _____

Round 1 2 3 4 5

#5 Algebra – Hustle
MAΘ National Convention 2016

For what value of c will $2x^3 - 5x^2 + cx + 6$ leave a remainder of 98 when divided by $x - 4$?

Answer : _____

Round 1 2 3 4 5

#5 Algebra – Hustle
MAΘ National Convention 2016

For what value of c will $2x^3 - 5x^2 + cx + 6$ leave a remainder of 98 when divided by $x - 4$?

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Round 1 2 3 4 5

#5 Algebra – Hustle
MAΘ National Convention 2016

For what value of c will $2x^3 - 5x^2 + cx + 6$ leave a remainder of 98 when divided by $x - 4$?

Answer : _____

Round 1 2 3 4 5

#6 Algebra – Hustle
MAΘ National Convention 2016

A quadratic polynomial $p(x)$ has relatively prime integral coefficients, and the roots of $p(x)$ are $2 \pm \frac{i\sqrt{3}}{2}$. Find $p(x)$.

Answer : _____

Round 1 2 3 4 5

#6 Algebra – Hustle
MAΘ National Convention 2016

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Answer : _____

Round 1 2 3 4 5

#7 Algebra – Hustle
MAΘ National Convention 2016

Solve for m: $\sqrt{25 \cdot \sqrt[3]{5}} \cdot \sqrt[3]{5 \cdot \sqrt[4]{25}} = 5^m$

Answer : _____

Round 1 2 3 4 5

#7 Algebra – Hustle
MAΘ National Convention 2016

Solve for m: $\sqrt{25 \cdot \sqrt[3]{5}} \cdot \sqrt[3]{5 \cdot \sqrt[4]{25}} = 5^m$

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Round 1 2 3 4 5

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Answer : _____

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#7 Algebra – Hustle
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Answer : _____

Round 1 2 3 4 5

#8 Algebra – Hustle
MAΘ National Convention 2016

What is the sixth term in the expansion of $\left(\frac{x}{2}-\frac{2}{x}\right)^8$, where terms in the expansion are written in descending order by the exponent of x?

Answer : _____

Round 1 2 3 4 5

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MAΘ National Convention 2016

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Round 1 2 3 4 5

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What is the sixth term in the expansion of $\left(\frac{x}{2}-\frac{2}{x}\right)^8$, where terms in the expansion are written in descending order by the exponent of x?

Answer : _____

Round 1 2 3 4 5

#9 Algebra – Hustle
MAΘ National Convention 2016

What is the least solution of the equation

$$\begin{vmatrix} -2 & -1 & x \\ x & 1 & 0 \\ -1 & 3 & 2 \end{vmatrix} = 2?$$

Answer : _____

Round 1 2 3 4 5

#9 Algebra – Hustle
MAΘ National Convention 2016

What is the least solution of the equation

$$\begin{vmatrix} -2 & -1 & x \\ x & 1 & 0 \\ -1 & 3 & 2 \end{vmatrix} = 2?$$

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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

#10 Algebra – Hustle
MAΘ National Convention 2016

Three Mu Alpha Theta sponsors who are no longer teenagers observe that the product of their ages is 26,390. What is the sum of their ages?

Answer : _____

Round 1 2 3 4 5

#10 Algebra – Hustle
MAΘ National Convention 2016

Three Mu Alpha Theta sponsors who are no longer teenagers observe that the product of their ages is 26,390. What is the sum of their ages?

Answer : _____

Round 1 2 3 4 5

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Round 1 2 3 4 5

#11 Algebra – Hustle
MAΘ National Convention 2016

The roots of $P(x)=x^3+Ax^2-2Ax-8$ are integral and form an increasing arithmetic progression. Find the value of *A*.

Answer : _____

Round 1 2 3 4 5

#11 Algebra – Hustle
MAΘ National Convention 2016

The roots of $P(x)=x^3+Ax^2-2Ax-8$ are integral and form an increasing arithmetic progression. Find the value of *A*.

Answer : _____

Round 1 2 3 4 5

#11 Algebra – Hustle
MAΘ National Convention 2016

The roots of $P(x)=x^3+Ax^2-2Ax-8$ are integral and form an increasing arithmetic progression. Find the value of *A*.

Answer : _____

Round 1 2 3 4 5

#11 Algebra – Hustle
MAΘ National Convention 2016

The roots of $P(x)=x^3+Ax^2-2Ax-8$ are integral and form an increasing arithmetic progression. Find the value of *A*.

Answer : _____

Round 1 2 3 4 5

#12 Algebra – Hustle
MAΘ National Convention 2016

If two cards are randomly selected without replacement from a standard deck of 52 cards, what is the probability that they are both clubs or both face cards?

Answer : _____

Round 1 2 3 4 5

#12 Algebra – Hustle
MAΘ National Convention 2016

If two cards are randomly selected without replacement from a standard deck of 52 cards, what is the probability that they are both clubs or both face cards?

Answer : _____

Round 1 2 3 4 5

#12 Algebra – Hustle
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Answer : _____

Round 1 2 3 4 5

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MAΘ National Convention 2016

If two cards are randomly selected without replacement from a standard deck of 52 cards, what is the probability that they are both clubs or both face cards?

Answer : _____

Round 1 2 3 4 5

#13 Algebra – Hustle
MAΘ National Convention 2016

If $n!$ ends in exactly six consecutive zeros, and if n is prime, then what is the value of n?

Answer : _____

Round 1 2 3 4 5

#13 Algebra – Hustle
MAΘ National Convention 2016

If $n!$ ends in exactly six consecutive zeros, and if n is prime, then what is the value of n?

Answer : _____

Round 1 2 3 4 5

#13 Algebra – Hustle
MAΘ National Convention 2016

If $n!$ ends in exactly six consecutive zeros, and if n is prime, then what is the value of n?

Answer : _____

Round 1 2 3 4 5

#13 Algebra – Hustle
MAΘ National Convention 2016

If $n!$ ends in exactly six consecutive zeros, and if n is prime, then what is the value of n?

Answer : _____

Round 1 2 3 4 5

#14 Algebra – Hustle
MAΘ National Convention 2016

Written in the form $a+bi$, where a and b are real and $i=\sqrt{-1}$, what is the reciprocal of $2-7i$?

Answer : _____

Round 1 2 3 4 5

#14 Algebra – Hustle
MAΘ National Convention 2016

Written in the form $a+bi$, where a and b are real and $i=\sqrt{-1}$, what is the reciprocal of $2-7i$?

Answer : _____

Round 1 2 3 4 5

#14 Algebra – Hustle
MAΘ National Convention 2016

Written in the form $a+bi$, where a and b are real and $i=\sqrt{-1}$, what is the reciprocal of $2-7i$?

Answer : _____

Round 1 2 3 4 5

#14 Algebra – Hustle
MAΘ National Convention 2016

Written in the form $a+bi$, where a and b are real and $i=\sqrt{-1}$, what is the reciprocal of $2-7i$?

Answer : _____

Round 1 2 3 4 5

#15 Algebra – Hustle
MAΘ National Convention 2016

Find all integral solutions to the inequality
$2 < |3x + 1| \leq 7$.

Answer : _____

Round 1 2 3 4 5

#15 Algebra – Hustle
MAΘ National Convention 2016

Find all integral solutions to the inequality
$2 < |3x + 1| \leq 7$.

Answer : _____

Round 1 2 3 4 5

#15 Algebra – Hustle
MAΘ National Convention 2016

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$2 < |3x + 1| \leq 7$.

Answer : _____

Round 1 2 3 4 5

#15 Algebra – Hustle
MAΘ National Convention 2016

Find all integral solutions to the inequality
$2 < |3x + 1| \leq 7$.

Answer : _____

Round 1 2 3 4 5

#16 Algebra – Hustle
MAΘ National Convention 2016

A finite arithmetic series has sum -120. The first term of the series is 13 while the common difference of the series is -3. How many terms are in the series?

Answer : _____

Round 1 2 3 4 5

#16 Algebra – Hustle
MAΘ National Convention 2016

A finite arithmetic series has sum -120. The first term of the series is 13 while the common difference of the series is -3. How many terms are in the series?

Answer : _____

Round 1 2 3 4 5

#16 Algebra – Hustle
MAΘ National Convention 2016

A finite arithmetic series has sum -120. The first term of the series is 13 while the common difference of the series is -3. How many terms are in the series?

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Round 1 2 3 4 5

#16 Algebra – Hustle
MAΘ National Convention 2016

A finite arithmetic series has sum -120. The first term of the series is 13 while the common difference of the series is -3. How many terms are in the series?

Answer : _____

Round 1 2 3 4 5

#17 Algebra – Hustle
MAΘ National Convention 2016

Find the solution to the inequality $\left|x^2-12x+18\right|<18$, written in interval notation.

Answer : _____

Round 1 2 3 4 5

#17 Algebra – Hustle
MAΘ National Convention 2016

Find the solution to the inequality $\left|x^2-12x+18\right|<18$, written in interval notation.

Answer : _____

Round 1 2 3 4 5

#17 Algebra – Hustle
MAΘ National Convention 2016

Find the solution to the inequality $\left|x^2-12x+18\right|<18$, written in interval notation.

Answer : _____

Round 1 2 3 4 5

#17 Algebra – Hustle
MAΘ National Convention 2016

Find the solution to the inequality $\left|x^2-12x+18\right|<18$, written in interval notation.

Answer : _____

Round 1 2 3 4 5

#18 Algebra – Hustle
MAΘ National Convention 2016

Write as a fraction in lowest terms: $0.13\overline{8}$

Answer : _____

Round 1 2 3 4 5

#18 Algebra – Hustle
MAΘ National Convention 2016

Write as a fraction in lowest terms: $0.13\overline{8}$

Answer : _____

Round 1 2 3 4 5

#18 Algebra – Hustle
MAΘ National Convention 2016

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Answer : _____

Round 1 2 3 4 5

#18 Algebra – Hustle
MAΘ National Convention 2016

Write as a fraction in lowest terms: $0.13\overline{8}$

Answer : _____

Round 1 2 3 4 5

#19 Algebra – Hustle
MAΘ National Convention 2016

Find all ordered pairs of real numbers (x, y) that are solutions of the system

$$\begin{cases} x^2 + y^2 + 2y = 10 \\ x^2 + 4y = 7 \end{cases}.$$

Answer : _____

Round 1 2 3 4 5

#19 Algebra – Hustle
MAΘ National Convention 2016

Find all ordered pairs of real numbers (x, y) that are solutions of the system

$$\begin{cases} x^2 + y^2 + 2y = 10 \\ x^2 + 4y = 7 \end{cases}.$$

Answer : _____

Round 1 2 3 4 5

#19 Algebra – Hustle
MAΘ National Convention 2016

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Round 1 2 3 4 5

#19 Algebra – Hustle
MAΘ National Convention 2016

Find all ordered pairs of real numbers (x, y) that are solutions of the system

$$\begin{cases} x^2 + y^2 + 2y = 10 \\ x^2 + 4y = 7 \end{cases}.$$

Answer : _____

Round 1 2 3 4 5

#20 Algebra – Hustle
MAΘ National Convention 2016

Solve for matrix X:

$$\begin{bmatrix} -7 & 2 \\ 3 & 1 \end{bmatrix} X = \begin{bmatrix} -23 & -18 & -11 \\ 8 & 17 & 1 \end{bmatrix}$$

Answer : _____

Round 1 2 3 4 5

#20 Algebra – Hustle
MAΘ National Convention 2016

Solve for matrix X:

$$\begin{bmatrix} -7 & 2 \\ 3 & 1 \end{bmatrix} X = \begin{bmatrix} -23 & -18 & -11 \\ 8 & 17 & 1 \end{bmatrix}$$

Answer : _____

Round 1 2 3 4 5

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MAΘ National Convention 2016

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Round 1 2 3 4 5

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MAΘ National Convention 2016

Solve for matrix X:

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Answer : _____

Round 1 2 3 4 5

#21 Algebra – Hustle
MAΘ National Convention 2016

If K is the least common multiple of all two-digit perfect squares, what is the value of $\sqrt{K}$?

Answer : _____

Round 1 2 3 4 5

#21 Algebra – Hustle
MAΘ National Convention 2016

If K is the least common multiple of all two-digit perfect squares, what is the value of $\sqrt{K}$?

Answer : _____

Round 1 2 3 4 5

#21 Algebra – Hustle
MAΘ National Convention 2016

If K is the least common multiple of all two-digit perfect squares, what is the value of $\sqrt{K}$?

Answer : _____

Round 1 2 3 4 5

#21 Algebra – Hustle
MAΘ National Convention 2016

If K is the least common multiple of all two-digit perfect squares, what is the value of $\sqrt{K}$?

Answer : _____

Round 1 2 3 4 5

#22 Algebra – Hustle
MAΘ National Convention 2016

Evaluate when $x=-13$:

$$\left(x^{\frac{2}{3}}-10^{\frac{1}{3}}\right)\left(x^{\frac{4}{3}}+10^{\frac{1}{3}}x^{\frac{2}{3}}+10^{\frac{2}{3}}\right)$$

Answer : _____

Round 1 2 3 4 5

#22 Algebra – Hustle
MAΘ National Convention 2016

Evaluate when $x=-13$:

$$\left(x^{\frac{2}{3}}-10^{\frac{1}{3}}\right)\left(x^{\frac{4}{3}}+10^{\frac{1}{3}}x^{\frac{2}{3}}+10^{\frac{2}{3}}\right)$$

Answer : _____

Round 1 2 3 4 5

#22 Algebra – Hustle
MAΘ National Convention 2016

Evaluate when $x=-13$:

$$\left(x^{\frac{2}{3}}-10^{\frac{1}{3}}\right)\left(x^{\frac{4}{3}}+10^{\frac{1}{3}}x^{\frac{2}{3}}+10^{\frac{2}{3}}\right)$$

Answer : _____

Round 1 2 3 4 5

#22 Algebra – Hustle
MAΘ National Convention 2016

Evaluate when $x=-13$:

$$\left(x^{\frac{2}{3}}-10^{\frac{1}{3}}\right)\left(x^{\frac{4}{3}}+10^{\frac{1}{3}}x^{\frac{2}{3}}+10^{\frac{2}{3}}\right)$$

Answer : _____

Round 1 2 3 4 5

#23 Algebra – Hustle
MAΘ National Convention 2016

What is the exact value of the irrational solution to the equation $5^x + \frac{10}{5^x} = 7$?

Answer : _____

Round 1 2 3 4 5

#23 Algebra – Hustle
MAΘ National Convention 2016

What is the exact value of the irrational solution to the equation $5^x + \frac{10}{5^x} = 7$?

Answer : _____

Round 1 2 3 4 5

#23 Algebra – Hustle
MAΘ National Convention 2016

What is the exact value of the irrational solution to the equation $5^x + \frac{10}{5^x} = 7$?

Answer : _____

Round 1 2 3 4 5

#23 Algebra – Hustle
MAΘ National Convention 2016

What is the exact value of the irrational solution to the equation $5^x + \frac{10}{5^x} = 7$?

Answer : _____

Round 1 2 3 4 5

#24 Algebra – Hustle
MAΘ National Convention 2016

Find the non-zero coordinate of the *y*-intercept of the slant asymptote of $f(x)=\frac{2x^3-5x^2+7}{x^2+3x-1}$?

Answer : _____

Round 1 2 3 4 5

#24 Algebra – Hustle
MAΘ National Convention 2016

Find the non-zero coordinate of the *y*-intercept of the slant asymptote of $f(x)=\frac{2x^3-5x^2+7}{x^2+3x-1}$?

Answer : _____

Round 1 2 3 4 5

#24 Algebra – Hustle
MAΘ National Convention 2016

Find the non-zero coordinate of the *y*-intercept of the slant asymptote of $f(x)=\frac{2x^3-5x^2+7}{x^2+3x-1}$?

Answer : _____

Round 1 2 3 4 5

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Answer : _____

Round 1 2 3 4 5

#25 Algebra – Hustle
MAΘ National Convention 2016

Paul can solve 25 word problems in 18 minutes; Rob can solve the same set of problems in 30 minutes. How many minutes would it take them to solve the entire set if they work together independently and simultaneously?

Answer : _____

Round 1 2 3 4 5

#25 Algebra – Hustle
MAΘ National Convention 2016

Paul can solve 25 word problems in 18 minutes; Rob can solve the same set of problems in 30 minutes. How many minutes would it take them to solve the entire set if they work together independently and simultaneously?

Answer : _____

Round 1 2 3 4 5

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MAΘ National Convention 2016

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Answer : _____

Round 1 2 3 4 5