#1 Precalculus – Hustle
MAO National Convention 2025

Find the tangent of the acute angle formed by the lines of $2x - y = 7$ and $2x + 8y = 3$

Answer: _____

Round 1 2 3 4 5

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Answer: _____

Round 1 2 3 4 5

#2 Precalculus – Hustle
MAO National Convention 2025

Find the area of the region bounded by the polar graph $r = 4\sin(\theta) + 2\cos(\theta)$

Answer: _____

Round 1 2 3 4 5

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Answer: _____

Round 1 2 3 4 5

#3 Precalculus – Hustle
MAO National Convention 2025

Find the slope of the tangent line to the graph $f(x) = \frac{x+2}{x^2-4}$ at $x = 6$

Answer: _____

Round 1 2 3 4 5

#3 Precalculus – Hustle
MAO National Convention 2025

Find the slope of the tangent line to the graph $f(x) = \frac{x+2}{x^2-4}$ at $x = 6$

Answer: _____

Round 1 2 3 4 5

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MAO National Convention 2025

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Answer: _____

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MAO National Convention 2025

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Answer: _____

Round 1 2 3 4 5

#4 Precalculus – Hustle
MAO National Convention 2025

Compute:

$$\prod_{n=0}^{4}\left(\sqrt{3}-i\right)^{n}, where\ i=\sqrt{-1}$$

Answer: _____

Round 1 2 3 4 5

#4 Precalculus – Hustle
MAO National Convention 2025

Compute:

$$\prod_{n=0}^{4}\left(\sqrt{3}-i\right)^{n}, where\ i=\sqrt{-1}$$

Answer: _____

Round 1 2 3 4 5

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Round 1 2 3 4 5

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$$\prod_{n=0}^{4}\left(\sqrt{3}-i\right)^{n}, where\ i=\sqrt{-1}$$

Answer: _____

Round 1 2 3 4 5

#5 Precalculus – Hustle
MAO National Convention 2025

An integer *n* is chosen randomly on the interval [1,100]. Find the probability that the expression $n^2(n+1)(n+3)$ is divisible by 8.

Answer: _____

Round 1 2 3 4 5

#5 Precalculus – Hustle
MAO National Convention 2025

An integer *n* is chosen randomly on the interval [1,100]. Find the probability that the expression $n^2(n+1)(n+3)$ is divisible by 8.

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MAO National Convention 2025

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Answer: _____

Round 1 2 3 4 5

#6 Precalculus – Hustle
MAO National Convention 2025

Find the distinct number of positive integer divisors of 288

Answer: _____

Round 1 2 3 4 5

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MAO National Convention 2025

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Answer: _____

Round 1 2 3 4 5

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MAO National Convention 2025

Find the distinct number of positive integer divisors of 288

Answer: _____

Round 1 2 3 4 5

#7 Precalculus – Hustle
MAO National Convention 2025

Compute $\sin\left(\frac{\pi}{8}\right)\sin\left(\frac{3\pi}{8}\right)\sin\left(\frac{5\pi}{8}\right)\sin\left(\frac{7\pi}{8}\right)$

Answer: _____

Round 1 2 3 4 5

#7 Precalculus – Hustle
MAO National Convention 2025

Compute $\sin\left(\frac{\pi}{8}\right)\sin\left(\frac{3\pi}{8}\right)\sin\left(\frac{5\pi}{8}\right)\sin\left(\frac{7\pi}{8}\right)$

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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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MAO National Convention 2025

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Answer: _____

Round 1 2 3 4 5

#8 Precalculus – Hustle
MAO National Convention 2025

Solve for y, given x is a positive integer and $2^x 3^y 5^{(x+2)} = 202{,}500$.

Answer: _____

Round 1 2 3 4 5

#8 Precalculus – Hustle
MAO National Convention 2025

Solve for y, given x is a positive integer and $2^x 3^y 5^{(x+2)} = 202{,}500$.

Answer: _____

Round 1 2 3 4 5

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Answer: _____

Round 1 2 3 4 5

#8 Precalculus – Hustle
MAO National Convention 2025

Solve for y, given x is a positive integer and $2^x 3^y 5^{(x+2)} = 202{,}500$.

Answer: _____

Round 1 2 3 4 5

#9 Precalculus – Hustle
MAO National Convention 2025

Evaluate $\lim_{x\to 4}\left(\frac{\frac{1}{x+3}-\frac{1}{x+4}}{\frac{1}{x^2-16}}\right)$

Answer: _____

Round 1 2 3 4 5

#9 Precalculus – Hustle
MAO National Convention 2025

Evaluate $\lim_{x\to 4}\left(\frac{\frac{1}{x+3}-\frac{1}{x+4}}{\frac{1}{x^2-16}}\right)$

Answer: _____

Round 1 2 3 4 5

#9 Precalculus – Hustle
MAO National Convention 2025

Evaluate $\lim_{x\to 4}\left(\frac{\frac{1}{x+3}-\frac{1}{x+4}}{\frac{1}{x^2-16}}\right)$

Answer: _____

Round 1 2 3 4 5

#9 Precalculus – Hustle
MAO National Convention 2025

Evaluate $\lim_{x\to 4}\left(\frac{\frac{1}{x+3}-\frac{1}{x+4}}{\frac{1}{x^2-16}}\right)$

Answer: _____

Round 1 2 3 4 5

#10 Precalculus – Hustle
MAO National Convention 2025

Find the total number of asymptotes in the graph $y = \frac{x^3-1}{2x^4+x^2-3}$

Answer: _____

Round 1 2 3 4 5

#10 Precalculus – Hustle
MAO National Convention 2025

Find the total number of asymptotes in the graph $y = \frac{x^3-1}{2x^4+x^2-3}$

Answer: _____

Round 1 2 3 4 5

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Round 1 2 3 4 5

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MAO National Convention 2025

Find the total number of asymptotes in the graph $y = \frac{x^3-1}{2x^4+x^2-3}$

Answer: _____

Round 1 2 3 4 5

#11 Precalculus – Hustle
MAO National Convention 2025

Find the sum of the reciprocal and conjugate of $2 - i$, where $i = \sqrt{-1}$

Answer: _____

Round 1 2 3 4 5

#11 Precalculus – Hustle
MAO National Convention 2025

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Round 1 2 3 4 5

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Round 1 2 3 4 5

#11 Precalculus – Hustle
MAO National Convention 2025

Find the sum of the reciprocal and conjugate of $2 - i$, where $i = \sqrt{-1}$

Answer: _____

Round 1 2 3 4 5

#12 Precalculus – Hustle
MAO National Convention 2025

Find the sum of the arithmetic sequence:
2, 6, 10, … , 218

Answer: _____

Round 1 2 3 4 5

#12 Precalculus – Hustle
MAO National Convention 2025

Find the sum of the arithmetic sequence:
2, 6, 10, … , 218

Answer: _____

Round 1 2 3 4 5

#12 Precalculus – Hustle
MAO National Convention 2025

Find the sum of the arithmetic sequence:
2, 6, 10, … , 218

Answer: _____

Round 1 2 3 4 5

#12 Precalculus – Hustle
MAO National Convention 2025

Find the sum of the arithmetic sequence:
2, 6, 10, … , 218

Answer: _____

Round 1 2 3 4 5

#13 Precalculus – Hustle
MAO National Convention 2025

Find the area of a triangle with vertices $(2,5)$, $(5,8)$, and $(7,-1)$

Answer: _____

Round 1 2 3 4 5

#13 Precalculus – Hustle
MAO National Convention 2025

Find the area of a triangle with vertices $(2,5)$, $(5,8)$, and $(7,-1)$

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Round 1 2 3 4 5

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Find the area of a triangle with vertices $(2,5)$, $(5,8)$, and $(7,-1)$

Answer: _____

Round 1 2 3 4 5

#14 Precalculus – Hustle
MAO National Convention 2025

Find the number of ones in the binary representation of the base 10 number 383.

Answer: _____

Round 1 2 3 4 5

#14 Precalculus – Hustle
MAO National Convention 2025

Find the number of ones in the binary representation of the base 10 number 383.

Answer: _____

Round 1 2 3 4 5

#14 Precalculus – Hustle
MAO National Convention 2025

Find the number of ones in the binary representation of the base 10 number 383.

Answer: _____

Round 1 2 3 4 5

#14 Precalculus – Hustle
MAO National Convention 2025

Find the number of ones in the binary representation of the base 10 number 383.

Answer: _____

Round 1 2 3 4 5

#15 Precalculus – Hustle
MAO National Convention 2025

For triangle ABC: $AB = 8$, $BC = 12$, and the area of triangle ABC is 36. What is the value of $\cos B$?

Answer: _____

Round 1 2 3 4 5

#15 Precalculus – Hustle
MAO National Convention 2025

For triangle ABC: $AB = 8$, $BC = 12$, and the area of triangle ABC is 36. What is the value of $\cos B$?

Answer: _____

Round 1 2 3 4 5

#15 Precalculus – Hustle
MAO National Convention 2025

For triangle ABC: $AB = 8$, $BC = 12$, and the area of triangle ABC is 36. What is the value of $\cos B$?

Answer: _____

Round 1 2 3 4 5

#15 Precalculus – Hustle
MAO National Convention 2025

For triangle ABC: $AB = 8$, $BC = 12$, and the area of triangle ABC is 36. What is the value of $\cos B$?

Answer: _____

Round 1 2 3 4 5

#16 Precalculus – Hustle
MAO National Convention 2025

Find the perimeter *(in radians)* of a sector with a central angle of $\frac{\pi}{4}$ and an area of 32π.

Answer: _____

Round 1 2 3 4 5

#16 Precalculus – Hustle
MAO National Convention 2025

Find the perimeter *(in radians)* of a sector with a central angle of $\frac{\pi}{4}$ and an area of 32π.

Answer: _____

Round 1 2 3 4 5

#16 Precalculus – Hustle
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Answer: _____

Round 1 2 3 4 5

#16 Precalculus – Hustle
MAO National Convention 2025

Find the perimeter *(in radians)* of a sector with a central angle of $\frac{\pi}{4}$ and an area of 32π.

Answer: _____

Round 1 2 3 4 5

#17 Precalculus – Hustle
MAO National Convention 2025

Find the probability that a randomly chosen positive integer factor of 144 is also a positive integer factor of 400

Answer: _____

Round 1 2 3 4 5

#17 Precalculus – Hustle
MAO National Convention 2025

Find the probability that a randomly chosen positive integer factor of 144 is also a positive integer factor of 400

Answer: _____

Round 1 2 3 4 5

#17 Precalculus – Hustle
MAO National Convention 2025

Find the probability that a randomly chosen positive integer factor of 144 is also a positive integer factor of 400

Answer: _____

Round 1 2 3 4 5

#17 Precalculus – Hustle
MAO National Convention 2025

Find the probability that a randomly chosen positive integer factor of 144 is also a positive integer factor of 400

Answer: _____

Round 1 2 3 4 5

#18 Precalculus – Hustle
MAO National Convention 2025

Find the trace of the matrix:

$$\begin{bmatrix} 5 & 1 & 9 \\ 4 & -6 & 3 \\ -2 & 7 & 12 \end{bmatrix}$$

Answer: _____

Round 1 2 3 4 5

#18 Precalculus – Hustle
MAO National Convention 2025

Find the trace of the matrix:

$$\begin{bmatrix} 5 & 1 & 9 \\ 4 & -6 & 3 \\ -2 & 7 & 12 \end{bmatrix}$$

Answer: _____

Round 1 2 3 4 5

#18 Precalculus – Hustle
MAO National Convention 2025

Find the trace of the matrix:

$$\begin{bmatrix} 5 & 1 & 9 \\ 4 & -6 & 3 \\ -2 & 7 & 12 \end{bmatrix}$$

Answer: _____

Round 1 2 3 4 5

#18 Precalculus – Hustle
MAO National Convention 2025

Find the trace of the matrix:

$$\begin{bmatrix} 5 & 1 & 9 \\ 4 & -6 & 3 \\ -2 & 7 & 12 \end{bmatrix}$$

Answer: _____

Round 1 2 3 4 5

#19 Precalculus – Hustle
MAO National Convention 2025

Find the volume of the parallelepiped formed by the vectors $< 2,5,-8 >$, $< 7,11,6 >$, and $< -5,8,7 >$. *(Disregard units)*

Answer: _____

Round 1 2 3 4 5

#19 Precalculus – Hustle
MAO National Convention 2025

Find the volume of the parallelepiped formed by the vectors $< 2,5,-8 >$, $< 7,11,6 >$, and $< -5,8,7 >$. *(Disregard units)*

Answer: _____

Round 1 2 3 4 5

#19 Precalculus – Hustle
MAO National Convention 2025

Find the volume of the parallelepiped formed by the vectors $< 2,5,-8 >$, $< 7,11,6 >$, and $< -5,8,7 >$. *(Disregard units)*

Answer: _____

Round 1 2 3 4 5

#19 Precalculus – Hustle
MAO National Convention 2025

Find the volume of the parallelepiped formed by the vectors $< 2,5,-8 >$, $< 7,11,6 >$, and $< -5,8,7 >$. *(Disregard units)*

Answer: _____

Round 1 2 3 4 5

#20 Precalculus – Hustle
MAO National Convention 2025

Convert 36°27′288" into degrees

Answer: _____

Round 1 2 3 4 5

#20 Precalculus – Hustle
MAO National Convention 2025

Convert 36°27′288" into degrees

Answer: _____

Round 1 2 3 4 5

#20 Precalculus – Hustle
MAO National Convention 2025

Convert 36°27′288" into degrees

Answer: _____

Round 1 2 3 4 5

#20 Precalculus – Hustle
MAO National Convention 2025

Convert 36°27′288" into degrees

Answer: _____

Round 1 2 3 4 5

#21 Precalculus – Hustle
MAO National Convention 2025

Compute:

$$\cos\left(\frac{11}{12}\pi\right)$$

Answer: _____

Round 1 2 3 4 5

#21 Precalculus – Hustle
MAO National Convention 2025

Compute:

$$\cos\left(\frac{11}{12}\pi\right)$$

Answer: _____

Round 1 2 3 4 5

#21 Precalculus – Hustle
MAO National Convention 2025

Compute:

$$\cos\left(\frac{11}{12}\pi\right)$$

Answer: _____

Round 1 2 3 4 5

#21 Precalculus – Hustle
MAO National Convention 2025

Compute:

$$\cos\left(\frac{11}{12}\pi\right)$$

Answer: _____

Round 1 2 3 4 5

#22 Precalculus – Hustle
MAO National Convention 2025

Let $\frac{\pi}{2} < \alpha < \pi$ and $\frac{3\pi}{2} < \beta < 2\pi$, where $\tan(\alpha) = -\frac{4}{3}$ and $\cos(\beta) = \frac{5}{7}$. Find the value of the expression $\sin(-\beta - \alpha)$.

Answer: _____

Round 1 2 3 4 5

#22 Precalculus – Hustle
MAO National Convention 2025

Let $\frac{\pi}{2} < \alpha < \pi$ and $\frac{3\pi}{2} < \beta < 2\pi$, where $\tan(\alpha) = -\frac{4}{3}$ and $\cos(\beta) = \frac{5}{7}$. Find the value of the expression $\sin(-\beta - \alpha)$.

Answer: _____

Round 1 2 3 4 5

#22 Precalculus – Hustle
MAO National Convention 2025

Let $\frac{\pi}{2} < \alpha < \pi$ and $\frac{3\pi}{2} < \beta < 2\pi$, where $\tan(\alpha) = -\frac{4}{3}$ and $\cos(\beta) = \frac{5}{7}$. Find the value of the expression $\sin(-\beta - \alpha)$.

Answer: _____

Round 1 2 3 4 5

#22 Precalculus – Hustle
MAO National Convention 2025

Let $\frac{\pi}{2} < \alpha < \pi$ and $\frac{3\pi}{2} < \beta < 2\pi$, where $\tan(\alpha) = -\frac{4}{3}$ and $\cos(\beta) = \frac{5}{7}$. Find the value of the expression $\sin(-\beta - \alpha)$.

Answer: _____

Round 1 2 3 4 5

#23 Precalculus – Hustle
MAO National Convention 2025

Solve for x:

$$2^{2x+5} + 4^x = 528$$

Answer: _____

Round 1 2 3 4 5

#23 Precalculus – Hustle
MAO National Convention 2025

Solve for x:

$$2^{2x+5} + 4^x = 528$$

Answer: _____

Round 1 2 3 4 5

#23 Precalculus – Hustle
MAO National Convention 2025

Solve for x:

$$2^{2x+5} + 4^x = 528$$

Answer: _____

Round 1 2 3 4 5

#23 Precalculus – Hustle
MAO National Convention 2025

Solve for x:

$$2^{2x+5} + 4^x = 528$$

Answer: _____

Round 1 2 3 4 5

#24 Precalculus – Hustle
MAO National Convention 2025

Find the distance between the point $(6,2)$ and the line $4x + 12y = 11$

Answer: _____

Round 1 2 3 4 5

#24 Precalculus – Hustle
MAO National Convention 2025

Find the distance between the point $(6,2)$ and the line $4x + 12y = 11$

Answer: _____

Round 1 2 3 4 5

#24 Precalculus – Hustle
MAO National Convention 2025

Find the distance between the point $(6,2)$ and the line $4x + 12y = 11$

Answer: _____

Round 1 2 3 4 5

#24 Precalculus – Hustle
MAO National Convention 2025

Find the distance between the point $(6,2)$ and the line $4x + 12y = 11$

Answer: _____

Round 1 2 3 4 5

#25 Precalculus – Hustle
MAO National Convention 2025

Find the sum of the first ten terms in the geometric series:

$$\frac{1}{93}, \frac{1}{186}, \frac{1}{372}, \cdots$$

Answer: _____

Round 1 2 3 4 5

#25 Precalculus – Hustle
MAO National Convention 2025

Find the sum of the first ten terms in the geometric series:

$$\frac{1}{93}, \frac{1}{186}, \frac{1}{372}, \cdots$$

Answer: _____

Round 1 2 3 4 5

#25 Precalculus – Hustle
MAO National Convention 2025

Find the sum of the first ten terms in the geometric series:

$$\frac{1}{93}, \frac{1}{186}, \frac{1}{372}, \cdots$$

Answer: _____

Round 1 2 3 4 5

#25 Precalculus – Hustle
MAO National Convention 2025

Find the sum of the first ten terms in the geometric series:

$$\frac{1}{93}, \frac{1}{186}, \frac{1}{372}, \cdots$$

Answer: _____

Round 1 2 3 4 5