MU ALPHA THETA
NATIONAL CONVENTION
SAN DIEGO 2013

Hustle
Test #841
Trigonometry

MU ALPHA THETA
NATIONAL CONVENTION
SAN DIEGO 2013

Hustle
Test #841
Trigonometry

MU ALPHA THETA
NATIONAL CONVENTION
SAN DIEGO 2013

Hustle
Test #841
Trigonometry

MU ALPHA THETA
NATIONAL CONVENTION
SAN DIEGO 2013

Hustle
Test #841
Trigonometry

#1 Trigonometry – Hustle
MAθ National Convention 2013

Find the length of the hypotenuse of a right triangle with legs of length 3 and 7.

Answer : ______________________

Round 1 2 3 4 5

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Find the length of the hypotenuse of a right triangle with legs of length 3 and 7.

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Round 1 2 3 4 5

#2 Trigonometry – Hustle
MAθ National Convention 2013

Evaluate:

$$\cot^2\left(\frac{9\pi}{17}\right)-\tan^2\left(\frac{9\pi}{17}\right)+\cos^2\left(\frac{9\pi}{17}\right)+$$
$$\sec^2\left(\frac{9\pi}{17}\right)-\csc^2\left(\frac{9\pi}{17}\right)+\sin^2\left(\frac{9\pi}{17}\right)$$

Answer : _____

Round 1 2 3 4 5

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Answer : _____

Round 1 2 3 4 5

#3 Trigonometry – Hustle
MAθ National Convention 2013

In right triangle *SUN* with right angle U, NU=48, SN=73, and SU=55. Find $\csc N$ as a common fraction.

Answer : _____

Round 1 2 3 4 5

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MAθ National Convention 2013

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Answer : _____

Round 1 2 3 4 5

#4 Trigonometry – Hustle
MAθ National Convention 2013

Simplify $\frac{\sin 2A}{1-\cos 2A}$.

Answer : _____

Round 1 2 3 4 5

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Simplify $\frac{\sin 2A}{1-\cos 2A}$.

Answer : _____

Round 1 2 3 4 5

#5 Trigonometry – Hustle
MAθ National Convention 2013

Evaluate $\sin 75° - \sin 15°$. Your answer should contain no double radicals.

Answer : _____

Round 1 2 3 4 5

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MAθ National Convention 2013

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Round 1 2 3 4 5

#6 Trigonometry – Hustle
MAθ National Convention 2013

Solve for *x* over $\left[0°, 360°\right)$: $\cos x = \frac{1}{2}$. Express your answer(s) in degrees.

Answer : ______________________

Round 1 2 3 4 5

#6 Trigonometry – Hustle
MAθ National Convention 2013

Solve for *x* over $\left[0°, 360°\right)$: $\cos x = \frac{1}{2}$. Express your answer(s) in degrees.

Answer : ______________________

Round 1 2 3 4 5

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Round 1 2 3 4 5

#7 Trigonometry – Hustle
MAθ National Convention 2013

Find the least positive solution, in degrees, for $\sin^2\left(\frac{3}{2}x\right)=\frac{1}{4}$.

Answer : ________________________

Round 1 2 3 4 5

#7 Trigonometry – Hustle
MAθ National Convention 2013

Find the least positive solution, in degrees, for $\sin^2\left(\frac{3}{2}x\right)=\frac{1}{4}$.

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Round 1 2 3 4 5

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Round 1 2 3 4 5

#8 Trigonometry – Hustle
MAθ National Convention 2013

Let $i=\sqrt{-1}$. Write $2+2i$ in exponential form with least positive θ.

Answer : ______________________

Round 1 2 3 4 5

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Round 1 2 3 4 5

#9 Trigonometry – Hustle
MAθ National Convention 2013

Write the polar coordinates $(r, \theta) = \left(2, \frac{\pi}{3}\right)$ in Cartesian coordinates, (x, y).

Answer : _____

Round 1 2 3 4 5

#9 Trigonometry – Hustle
MAθ National Convention 2013

Write the polar coordinates $(r, \theta) = \left(2, \frac{\pi}{3}\right)$ in Cartesian coordinates, (x, y).

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Round 1 2 3 4 5

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Answer : _____

Round 1 2 3 4 5

#10 Trigonometry – Hustle
MAθ National Convention 2013

Let $i=\sqrt{-1}$. Simplify $\left(1+i\sqrt{3}\right)^6$.

Answer : ______________________

Round 1 2 3 4 5

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Answer : ______________________

Round 1 2 3 4 5

#11 Trigonometry – Hustle
MAθ National Convention 2013

Find the sum of the complex cube roots of unity.

Answer : _____

Round 1 2 3 4 5

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Find the sum of the complex cube roots of unity.

Answer : _____

Round 1 2 3 4 5

#12 Trigonometry – Hustle
MAθ National Convention 2013

Find the area of triangle *ABC* if BC=10, AC=20, and the measure of angle ACB is 120 degrees.

Answer : ______________________

Round 1 2 3 4 5

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Find the area of triangle *ABC* if BC=10, AC=20, and the measure of angle ACB is 120 degrees.

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Round 1 2 3 4 5

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Find the area of triangle *ABC* if BC=10, AC=20, and the measure of angle ACB is 120 degrees.

Answer : ______________________

Round 1 2 3 4 5

#13 Trigonometry – Hustle
MAθ National Convention 2013

If $\sin A = \frac{1}{6}$, find $\sin 3A$. Express your answer as a common fraction.

Answer : ______________________

Round 1 2 3 4 5

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Answer : ______________________

Round 1 2 3 4 5

#14 Trigonometry – Hustle
MAθ National Convention 2013

Find the area, in square inches, of a triangle with side lengths 2 in., 3 in., and 4 in.

Answer : _______________________

Round 1 2 3 4 5

#14 Trigonometry – Hustle
MAθ National Convention 2013

Find the area, in square inches, of a triangle with side lengths 2 in., 3 in., and 4 in.

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Round 1 2 3 4 5

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Find the area, in square inches, of a triangle with side lengths 2 in., 3 in., and 4 in.

Answer : _______________________

Round 1 2 3 4 5

#15 Trigonometry – Hustle
MAθ National Convention 2013

Simplify $\csc\theta\left(1-\cos^2\theta\right)$.

Answer : ______________________

Round 1 2 3 4 5

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Answer : ______________________

Round 1 2 3 4 5

#16 Trigonometry – Hustle
MAθ National Convention 2013

Simplify $\cos(270° - \alpha)\cot(180° - \alpha)$.

Answer : _____

Round 1 2 3 4 5

#16 Trigonometry – Hustle
MAθ National Convention 2013

Simplify $\cos(270° - \alpha)\cot(180° - \alpha)$.

Answer : _____

Round 1 2 3 4 5

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MAθ National Convention 2013

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Answer : _____

Round 1 2 3 4 5

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Simplify $\cos(270° - \alpha)\cot(180° - \alpha)$.

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Round 1 2 3 4 5

#17 Trigonometry – Hustle
MAθ National Convention 2013

In a triangle with sides *a*, *b*, and *c*, it is found that $(a+b+c)(a+b-c)=3ab$. Find the degree measure of the angle opposite side *c*.

Answer : ______________________

Round 1 2 3 4 5

#17 Trigonometry – Hustle
MAθ National Convention 2013

In a triangle with sides *a*, *b*, and *c*, it is found that $(a+b+c)(a+b-c)=3ab$. Find the degree measure of the angle opposite side *c*.

Answer : ______________________

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Answer : ______________________

Round 1 2 3 4 5

#18 Trigonometry – Hustle
MAθ National Convention 2013

Find the period, in radians, of
$f(x)=\cos(64x)+\sin(4x)+\tan(4x)+\cot(18x)$.

Answer : ______________________

Round 1 2 3 4 5

#18 Trigonometry – Hustle
MAθ National Convention 2013

Find the period, in radians, of
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$f(x)=\cos(64x)+\sin(4x)+\tan(4x)+\cot(18x)$.

Answer : ______________________

Round 1 2 3 4 5

#19 Trigonometry – Hustle
MAθ National Convention 2013

Evaluate: $\cos\left(Cos^{-1}\frac{5}{13}+Cos^{-1}\frac{3}{5}\right)$

Answer : ______________________

Round 1 2 3 4 5

#19 Trigonometry – Hustle
MAθ National Convention 2013

Evaluate: $\cos\left(Cos^{-1}\frac{5}{13}+Cos^{-1}\frac{3}{5}\right)$

Answer : ______________________

Round 1 2 3 4 5

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Answer : ______________________

Round 1 2 3 4 5

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Answer : ______________________

Round 1 2 3 4 5

#20 Trigonometry – Hustle
MAθ National Convention 2013

Find the cosine of the acute angle between the direction vectors of the lines $l_1 = (0,-3,4) + t(2,-1,2)$ and $l_2 = (1,3,0) + s(1,-2,3)$.

Answer : ______________________

Round 1 2 3 4 5

#20 Trigonometry – Hustle
MAθ National Convention 2013

Find the cosine of the acute angle between the direction vectors of the lines $l_1 = (0,-3,4) + t(2,-1,2)$ and $l_2 = (1,3,0) + s(1,-2,3)$.

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Answer : ______________________

Round 1 2 3 4 5

#21 Trigonometry – Hustle
MAθ National Convention 2013

Find $\tan\frac{\theta}{2}$ if $\sin\theta = -\frac{1}{3}$ and $\cos\theta < 0$.

Answer : _______________________

Round 1 2 3 4 5

#21 Trigonometry – Hustle
MAθ National Convention 2013

Find $\tan\frac{\theta}{2}$ if $\sin\theta = -\frac{1}{3}$ and $\cos\theta < 0$.

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Find $\tan\frac{\theta}{2}$ if $\sin\theta = -\frac{1}{3}$ and $\cos\theta < 0$.

Answer : _______________________

Round 1 2 3 4 5

#22 Trigonometry – Hustle
MAθ National Convention 2013

Given that $a=\frac{1}{2}$ and $(a+1)(b+1)=2$, find the radian measure of $\text{Tan}^{-1}a+\text{Tan}^{-1}b$.

Answer : _____

Round 1 2 3 4 5

#22 Trigonometry – Hustle
MAθ National Convention 2013

Given that $a=\frac{1}{2}$ and $(a+1)(b+1)=2$, find the radian measure of $\text{Tan}^{-1}a+\text{Tan}^{-1}b$.

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Answer : _____

Round 1 2 3 4 5

#23 Trigonometry – Hustle
MAθ National Convention 2013

Find the maximum value of
$y = 7\sin 3x - 4\sqrt{2}\cos 3x + 5$.

Answer : ______________________

Round 1 2 3 4 5

#23 Trigonometry – Hustle
MAθ National Convention 2013

Find the maximum value of
$y = 7\sin 3x - 4\sqrt{2}\cos 3x + 5$.

Answer : ______________________

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

#24 Trigonometry – Hustle
MAθ National Convention 2013

Find the image of $(-3,7)$ under a rotation about the origin through an angle of $\theta = -\frac{3\pi}{4}$.

Answer : _____

Round 1 2 3 4 5

#24 Trigonometry – Hustle
MAθ National Convention 2013

Find the image of $(-3,7)$ under a rotation about the origin through an angle of $\theta = -\frac{3\pi}{4}$.

Answer : _____

Round 1 2 3 4 5

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Answer : _____

Round 1 2 3 4 5

#24 Trigonometry – Hustle
MAθ National Convention 2013

Find the image of $(-3,7)$ under a rotation about the origin through an angle of $\theta = -\frac{3\pi}{4}$.

Answer : _____

Round 1 2 3 4 5

#25 Trigonometry – Hustle
MAθ National Convention 2013

The conic with equation $5x^2+3xy+y^2=4$ is an ellipse. The *x* and *y*-axes will coincide with the axes of the conic if the *x* and *y*-axes are rotated counterclockwise about the origin by an angle θ. Let $\theta_{\min}$ be the smallest such positive acute angle. Find $\cos\theta_{\min}$.

Answer : _____

Round 1 2 3 4 5

#25 Trigonometry – Hustle
MAθ National Convention 2013

The conic with equation $5x^2+3xy+y^2=4$ is an ellipse. The *x* and *y*-axes will coincide with the axes of the conic if the *x* and *y*-axes are rotated counterclockwise about the origin by an angle θ. Let $\theta_{\min}$ be the smallest such positive acute angle. Find $\cos\theta_{\min}$.

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Answer : _____

Round 1 2 3 4 5