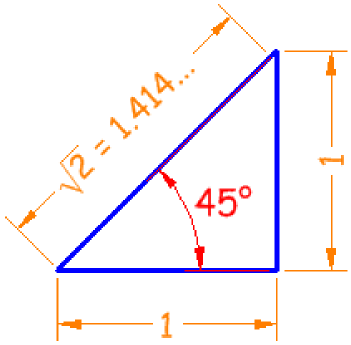
#1 Precalculus – Hustle
MAΘ National Convention 2017

Find the cosine of the marked angle on the triangle to the nearest tenth:

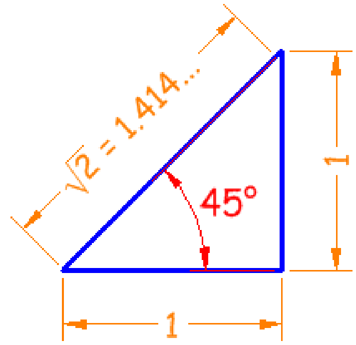


Answer : ____________________

Round 1 2 3 4 5

#1 Precalculus – Hustle
MAΘ National Convention 2017

Find the cosine of the marked angle on the triangle to the nearest tenth:

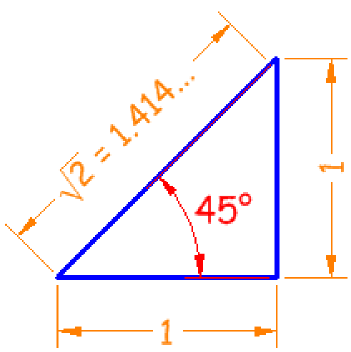


Answer : ____________________

Round 1 2 3 4 5

#1 Precalculus – Hustle
MAΘ National Convention 2017

Find the cosine of the marked angle on the triangle to the nearest tenth:

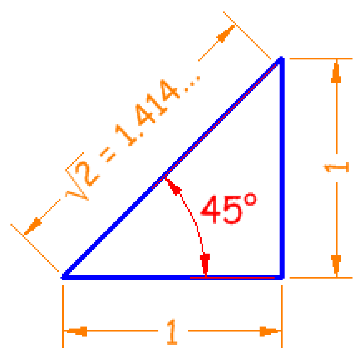


Answer : ____________________

Round 1 2 3 4 5

#1 Precalculus – Hustle
MAΘ National Convention 2017

Find the cosine of the marked angle on the triangle to the nearest tenth:



Answer : ____________________

Round 1 2 3 4 5

#2 Precalculus – Hustle
MAΘ National Convention 2017

If the circle with parametric equations $x = 3 + 3\cos t$ and $y = 5 + 3\sin t$ is written in the form $(x-h)^2 + (y-k)^2 = r^2$, where (h,k) are the Cartesian coordinates of the center of the circle and r is the length of the radius of the circle, find the value of $h+k+r$.

Answer : ______________________

Round 1 2 3 4 5

#2 Precalculus – Hustle
MAΘ National Convention 2017

If the circle with parametric equations $x = 3 + 3\cos t$ and $y = 5 + 3\sin t$ is written in the form $(x-h)^2 + (y-k)^2 = r^2$, where (h,k) are the Cartesian coordinates of the center of the circle and r is the length of the radius of the circle, find the value of $h+k+r$.

Answer : ______________________

Round 1 2 3 4 5

#2 Precalculus – Hustle
MAΘ National Convention 2017

If the circle with parametric equations $x = 3 + 3\cos t$ and $y = 5 + 3\sin t$ is written in the form $(x-h)^2 + (y-k)^2 = r^2$, where (h,k) are the Cartesian coordinates of the center of the circle and r is the length of the radius of the circle, find the value of $h+k+r$.

Answer : ______________________

Round 1 2 3 4 5

#2 Precalculus – Hustle
MAΘ National Convention 2017

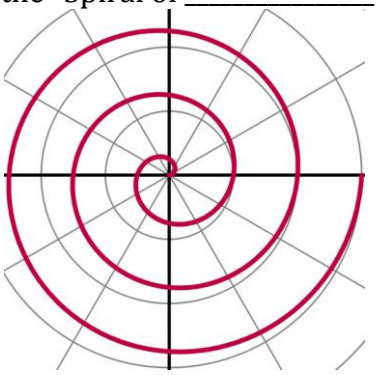
If the circle with parametric equations $x = 3 + 3\cos t$ and $y = 5 + 3\sin t$ is written in the form $(x-h)^2 + (y-k)^2 = r^2$, where (h,k) are the Cartesian coordinates of the center of the circle and r is the length of the radius of the circle, find the value of $h+k+r$.

Answer : ______________________

Round 1 2 3 4 5

#3 Precalculus – Hustle
MAΘ National Convention 2017

Fill in the blank: The following polar curve is known as the "Spiral of _____".

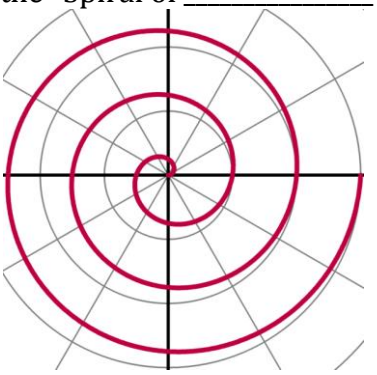


Answer : _____

Round 1 2 3 4 5

#3 Precalculus – Hustle
MAΘ National Convention 2017

Fill in the blank: The following polar curve is known as the "Spiral of _____".

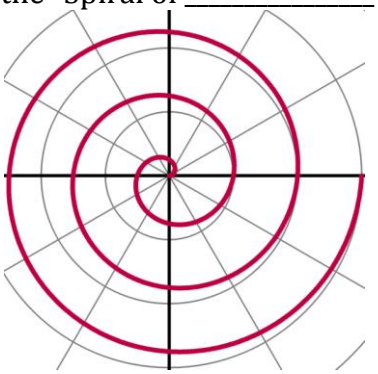


Answer : _____

Round 1 2 3 4 5

#3 Precalculus – Hustle
MAΘ National Convention 2017

Fill in the blank: The following polar curve is known as the "Spiral of _____".

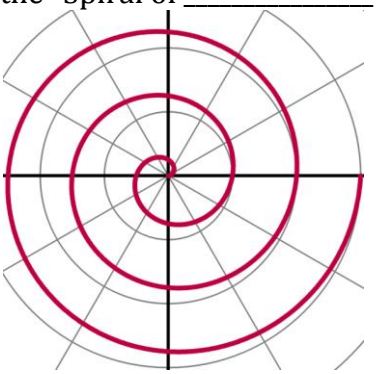


Answer : _____

Round 1 2 3 4 5

#3 Precalculus – Hustle
MAΘ National Convention 2017

Fill in the blank: The following polar curve is known as the "Spiral of _____".

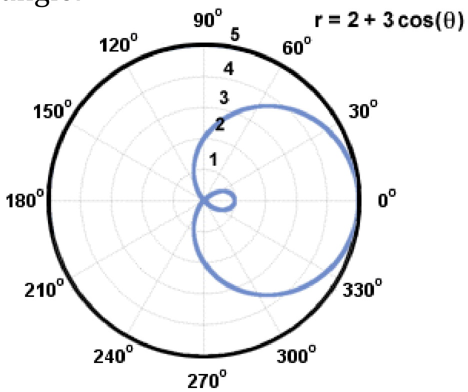


Answer : _____

Round 1 2 3 4 5

#4 Precalculus – Hustle
MAΘ National Convention 2017

Find the ordered pair of polar coordinates for the point on the inner loop farthest from the pole, using the least possible positive radian-measure angle:

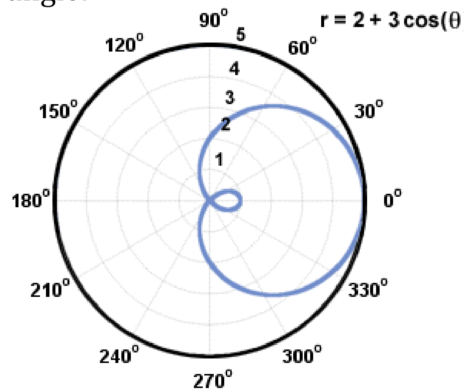


Answer : ____________________

Round 1 2 3 4 5

#4 Precalculus – Hustle
MAΘ National Convention 2017

Find the ordered pair of polar coordinates for the point on the inner loop farthest from the pole, using the least possible positive radian-measure angle:

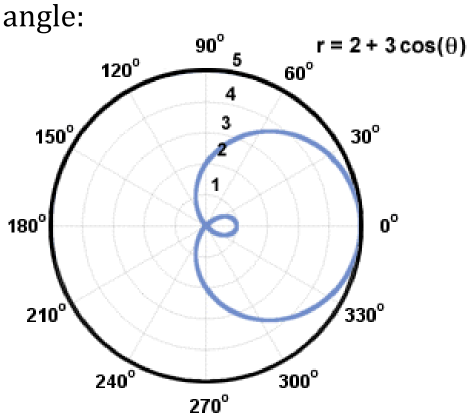


Answer : ____________________

Round 1 2 3 4 5

#4 Precalculus – Hustle
MAΘ National Convention 2017

Find the ordered pair of polar coordinates for the point on the inner loop farthest from the pole, using the least possible positive radian-measure angle:

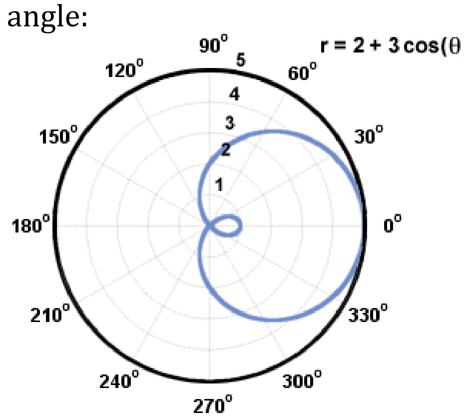


Answer : ____________________

Round 1 2 3 4 5

#4 Precalculus – Hustle
MAΘ National Convention 2017

Find the ordered pair of polar coordinates for the point on the inner loop farthest from the pole, using the least possible positive radian-measure angle:

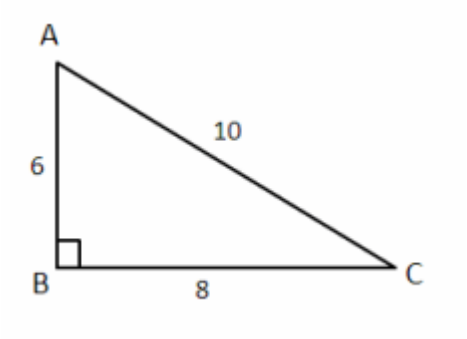


Answer : ____________________

Round 1 2 3 4 5

#5 Precalculus – Hustle
MAΘ National Convention 2017

Which angle in the diagram has measure equal to $\text{Arcsin}\frac{3}{5}$? List the letter of the vertex of the angle:

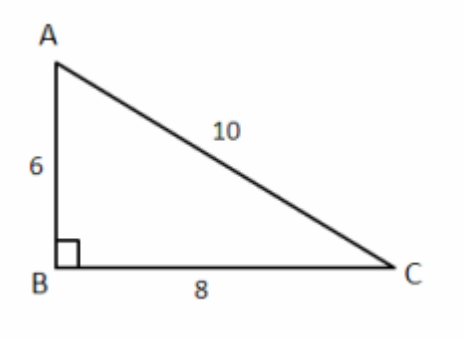


Answer : _____

Round 1 2 3 4 5

#5 Precalculus – Hustle
MAΘ National Convention 2017

Which angle in the diagram has measure equal to $\text{Arcsin}\frac{3}{5}$? List the letter of the vertex of the angle:

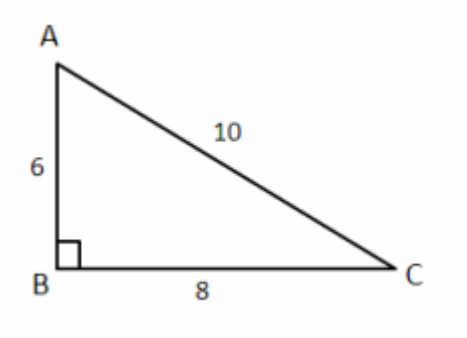


Answer : _____

Round 1 2 3 4 5

#5 Precalculus – Hustle
MAΘ National Convention 2017

Which angle in the diagram has measure equal to $\text{Arcsin}\frac{3}{5}$? List the letter of the vertex of the angle:

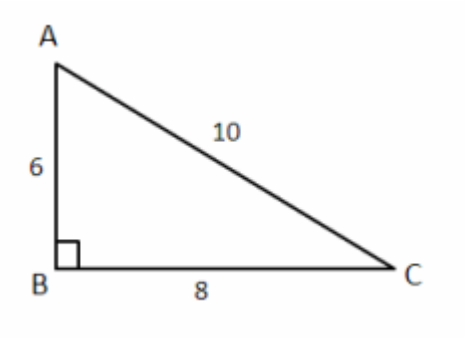


Answer : _____

Round 1 2 3 4 5

#5 Precalculus – Hustle
MAΘ National Convention 2017

Which angle in the diagram has measure equal to $\text{Arcsin}\frac{3}{5}$? List the letter of the vertex of the angle:

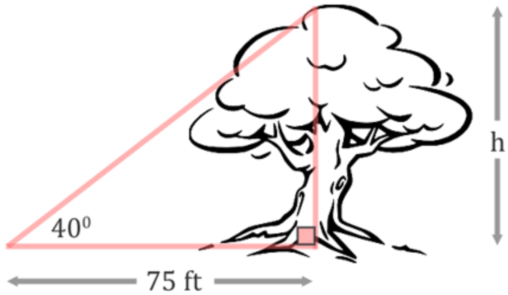


Answer : _____

Round 1 2 3 4 5

#6 Precalculus – Hustle
MAΘ National Convention 2017

Given that $\tan 40^\circ \approx 0.84$, find *h*, the height of the tree, to the nearest foot:

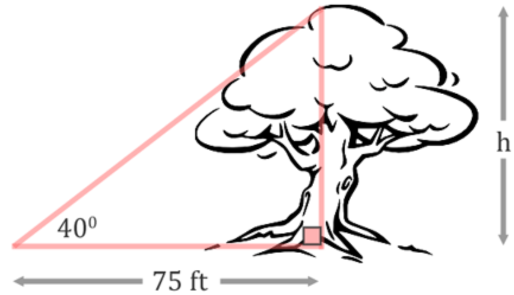


Answer : ______________________

Round 1 2 3 4 5

#6 Precalculus – Hustle
MAΘ National Convention 2017

Given that $\tan 40^\circ \approx 0.84$, find *h*, the height of the tree, to the nearest foot:

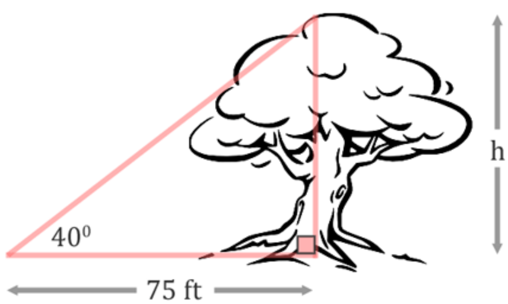


Answer : ______________________

Round 1 2 3 4 5

#6 Precalculus – Hustle
MAΘ National Convention 2017

Given that $\tan 40^\circ \approx 0.84$, find *h*, the height of the tree, to the nearest foot:

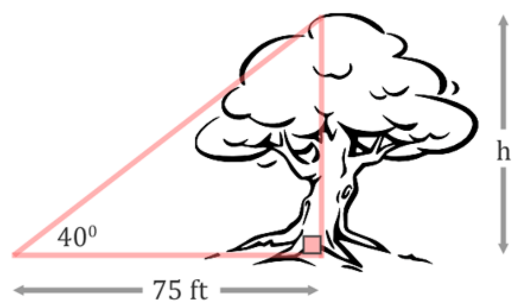


Answer : ______________________

Round 1 2 3 4 5

#6 Precalculus – Hustle
MAΘ National Convention 2017

Given that $\tan 40^\circ \approx 0.84$, find *h*, the height of the tree, to the nearest foot:



Answer : ______________________

Round 1 2 3 4 5

#7 Precalculus – Hustle
MAΘ National Convention 2017

Find the area enclosed by an isosceles right triangle with hypotenuse of length 24.

Answer : _____

Round 1 2 3 4 5

#7 Precalculus – Hustle
MAΘ National Convention 2017

Find the area enclosed by an isosceles right triangle with hypotenuse of length 24.

Answer : _____

Round 1 2 3 4 5

#7 Precalculus – Hustle
MAΘ National Convention 2017

Find the area enclosed by an isosceles right triangle with hypotenuse of length 24.

Answer : _____

Round 1 2 3 4 5

#7 Precalculus – Hustle
MAΘ National Convention 2017

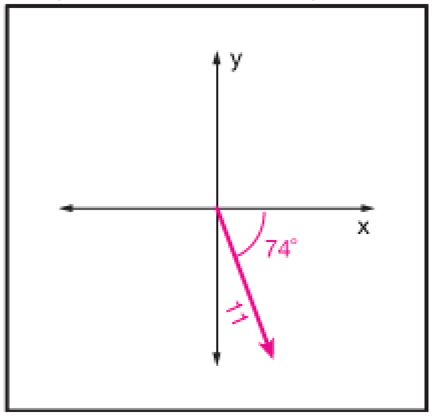
Find the area enclosed by an isosceles right triangle with hypotenuse of length 24.

Answer : _____

Round 1 2 3 4 5

#8 Precalculus – Hustle
MAΘ National Convention 2017

The vector in the diagram has a magnitude of 11, and the angle between the vector and the positive x-axis has measure 74°. Write the y-coordinate of the vector in the form $n\sin\theta$, where θ is the least possible positive degree-measure angle and n is an integer.

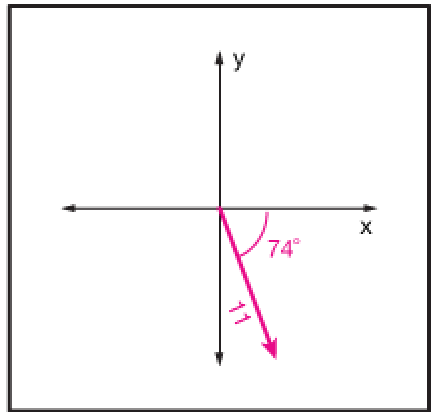


Answer : ____________________

Round 1 2 3 4 5

#8 Precalculus – Hustle
MAΘ National Convention 2017

The vector in the diagram has a magnitude of 11, and the angle between the vector and the positive x-axis has measure 74°. Write the y-coordinate of the vector in the form $n\sin\theta$, where θ is the least possible positive degree-measure angle and n is an integer.

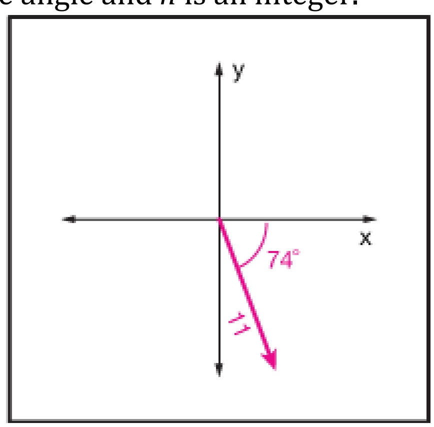


Answer : ____________________

Round 1 2 3 4 5

#8 Precalculus – Hustle
MAΘ National Convention 2017

The vector in the diagram has a magnitude of 11, and the angle between the vector and the positive x-axis has measure 74°. Write the y-coordinate of the vector in the form $n\sin\theta$, where θ is the least possible positive degree-measure angle and n is an integer.

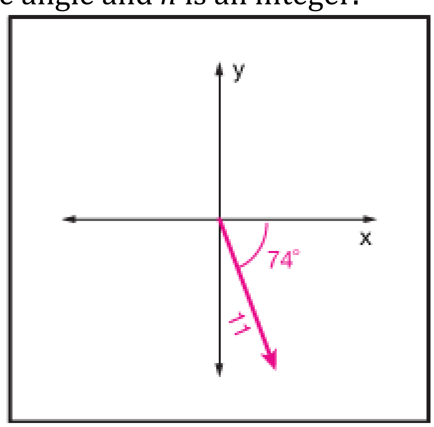


Answer : ____________________

Round 1 2 3 4 5

#8 Precalculus – Hustle
MAΘ National Convention 2017

The vector in the diagram has a magnitude of 11, and the angle between the vector and the positive x-axis has measure 74°. Write the y-coordinate of the vector in the form $n\sin\theta$, where θ is the least possible positive degree-measure angle and n is an integer.



Answer : ____________________

Round 1 2 3 4 5

#9 Precalculus – Hustle
MAΘ National Convention 2017

Find the arc length on a circle of an arc with a central angle of 45° and diameter of 10 units.

Answer : ______________________

Round 1 2 3 4 5

#9 Precalculus – Hustle
MAΘ National Convention 2017

Find the arc length on a circle of an arc with a central angle of 45° and diameter of 10 units.

Answer : ______________________

Round 1 2 3 4 5

#9 Precalculus – Hustle
MAΘ National Convention 2017

Find the arc length on a circle of an arc with a central angle of 45° and diameter of 10 units.

Answer : ______________________

Round 1 2 3 4 5

#9 Precalculus – Hustle
MAΘ National Convention 2017

Find the arc length on a circle of an arc with a central angle of 45° and diameter of 10 units.

Answer : ______________________

Round 1 2 3 4 5

#10 Precalculus – Hustle
MAΘ National Convention 2017

Evaluate the function $y = 4\cos(2x)$ at $x = \frac{3\pi}{8}$.

Answer : _____

Round 1 2 3 4 5

#10 Precalculus – Hustle
MAΘ National Convention 2017

Evaluate the function $y = 4\cos(2x)$ at $x = \frac{3\pi}{8}$.

Answer : _____

Round 1 2 3 4 5

#10 Precalculus – Hustle
MAΘ National Convention 2017

Evaluate the function $y = 4\cos(2x)$ at $x = \frac{3\pi}{8}$.

Answer : _____

Round 1 2 3 4 5

#10 Precalculus – Hustle
MAΘ National Convention 2017

Evaluate the function $y = 4\cos(2x)$ at $x = \frac{3\pi}{8}$.

Answer : _____

Round 1 2 3 4 5

#11 Precalculus – Hustle
MAΘ National Convention 2017

Find the area enclosed by the triangle whose vertices are at the points $(0,0,0)$, $(4,0,0)$, and $(1,2,0)$.

Answer : _____

Round 1 2 3 4 5

#11 Precalculus – Hustle
MAΘ National Convention 2017

Find the area enclosed by the triangle whose vertices are at the points $(0,0,0)$, $(4,0,0)$, and $(1,2,0)$.

Answer : _____

Round 1 2 3 4 5

#11 Precalculus – Hustle
MAΘ National Convention 2017

Find the area enclosed by the triangle whose vertices are at the points $(0,0,0)$, $(4,0,0)$, and $(1,2,0)$.

Answer : _____

Round 1 2 3 4 5

#11 Precalculus – Hustle
MAΘ National Convention 2017

Find the area enclosed by the triangle whose vertices are at the points $(0,0,0)$, $(4,0,0)$, and $(1,2,0)$.

Answer : _____

Round 1 2 3 4 5

#12 Precalculus – Hustle
MAΘ National Convention 2017

Find the component form of the vector with initial point $(1,2,0)$ and terminal point $(4,0,0)$.

Answer : _____

Round 1 2 3 4 5

#12 Precalculus – Hustle
MAΘ National Convention 2017

Find the component form of the vector with initial point $(1,2,0)$ and terminal point $(4,0,0)$.

Answer : _____

Round 1 2 3 4 5

#12 Precalculus – Hustle
MAΘ National Convention 2017

Find the component form of the vector with initial point $(1,2,0)$ and terminal point $(4,0,0)$.

Answer : _____

Round 1 2 3 4 5

#12 Precalculus – Hustle
MAΘ National Convention 2017

Find the component form of the vector with initial point $(1,2,0)$ and terminal point $(4,0,0)$.

Answer : _____

Round 1 2 3 4 5

#13 Precalculus – Hustle
MAΘ National Convention 2017

If $\vec{u}=\langle 1,2,0\rangle$ and $\vec{v}=\langle 4,0,0\rangle$, find $\vec{u}\times\vec{v}$ in component form.

Answer : _____

Round 1 2 3 4 5

#13 Precalculus – Hustle
MAΘ National Convention 2017

If $\vec{u}=\langle 1,2,0\rangle$ and $\vec{v}=\langle 4,0,0\rangle$, find $\vec{u}\times\vec{v}$ in component form.

Answer : _____

Round 1 2 3 4 5

#13 Precalculus – Hustle
MAΘ National Convention 2017

If $\vec{u}=\langle 1,2,0\rangle$ and $\vec{v}=\langle 4,0,0\rangle$, find $\vec{u}\times\vec{v}$ in component form.

Answer : _____

Round 1 2 3 4 5

#13 Precalculus – Hustle
MAΘ National Convention 2017

If $\vec{u}=\langle 1,2,0\rangle$ and $\vec{v}=\langle 4,0,0\rangle$, find $\vec{u}\times\vec{v}$ in component form.

Answer : _____

Round 1 2 3 4 5

#14 Precalculus – Hustle
MAΘ National Convention 2017

Classify the conic section whose polar equation is $r = \frac{24}{4 - 8\cos\theta}$.

Answer : _____

Round 1 2 3 4 5

#14 Precalculus – Hustle
MAΘ National Convention 2017

Classify the conic section whose polar equation is $r = \frac{24}{4 - 8\cos\theta}$.

Answer : _____

Round 1 2 3 4 5

#14 Precalculus – Hustle
MAΘ National Convention 2017

Classify the conic section whose polar equation is $r = \frac{24}{4 - 8\cos\theta}$.

Answer : _____

Round 1 2 3 4 5

#14 Precalculus – Hustle
MAΘ National Convention 2017

Classify the conic section whose polar equation is $r = \frac{24}{4 - 8\cos\theta}$.

Answer : _____

Round 1 2 3 4 5

#15 Precalculus – Hustle
MAΘ National Convention 2017

For the conic section with equation $r=\dfrac{24}{4-8\cos\theta}$, find the vertex with the greatest value of *r*, written in polar form with angle in the interval $[0,2\pi)$.

Answer : ______________________

Round 1 2 3 4 5

#15 Precalculus – Hustle
MAΘ National Convention 2017

For the conic section with equation $r=\dfrac{24}{4-8\cos\theta}$, find the vertex with the greatest value of *r*, written in polar form with angle in the interval $[0,2\pi)$.

Answer : ______________________

Round 1 2 3 4 5

#15 Precalculus – Hustle
MAΘ National Convention 2017

For the conic section with equation $r=\dfrac{24}{4-8\cos\theta}$, find the vertex with the greatest value of *r*, written in polar form with angle in the interval $[0,2\pi)$.

Answer : ______________________

Round 1 2 3 4 5

#15 Precalculus – Hustle
MAΘ National Convention 2017

For the conic section with equation $r=\dfrac{24}{4-8\cos\theta}$, find the vertex with the greatest value of *r*, written in polar form with angle in the interval $[0,2\pi)$.

Answer : ______________________

Round 1 2 3 4 5

#16 Precalculus – Hustle
MAΘ National Convention 2017

Find the value of a_{21} for the matrix

$$A=\begin{bmatrix} \frac{9}{2} & -2 & -\frac{7}{2} \\ -1 & 1 & 1 \\ -\frac{1}{2} & 0 & \frac{1}{2} \end{bmatrix}.$$

Answer : _____

Round 1 2 3 4 5

#16 Precalculus – Hustle
MAΘ National Convention 2017

Find the value of a_{21} for the matrix

$$A=\begin{bmatrix} \frac{9}{2} & -2 & -\frac{7}{2} \\ -1 & 1 & 1 \\ -\frac{1}{2} & 0 & \frac{1}{2} \end{bmatrix}.$$

Answer : _____

Round 1 2 3 4 5

#16 Precalculus – Hustle
MAΘ National Convention 2017

Find the value of a_{21} for the matrix

$$A=\begin{bmatrix} \frac{9}{2} & -2 & -\frac{7}{2} \\ -1 & 1 & 1 \\ -\frac{1}{2} & 0 & \frac{1}{2} \end{bmatrix}.$$

Answer : _____

Round 1 2 3 4 5

#16 Precalculus – Hustle
MAΘ National Convention 2017

Find the value of a_{21} for the matrix

$$A=\begin{bmatrix} \frac{9}{2} & -2 & -\frac{7}{2} \\ -1 & 1 & 1 \\ -\frac{1}{2} & 0 & \frac{1}{2} \end{bmatrix}.$$

Answer : _____

Round 1 2 3 4 5

#17 Precalculus – Hustle
MAΘ National Convention 2017

Find the value of the determinant of the matrix

$$A=\begin{bmatrix} 9/2 & -2 & -7/2 \\ -1 & 1 & 1 \\ -1/2 & 0 & 1/2 \end{bmatrix}.$$

Answer : _____

Round 1 2 3 4 5

#17 Precalculus – Hustle
MAΘ National Convention 2017

Find the value of the determinant of the matrix

$$A=\begin{bmatrix} 9/2 & -2 & -7/2 \\ -1 & 1 & 1 \\ -1/2 & 0 & 1/2 \end{bmatrix}.$$

Answer : _____

Round 1 2 3 4 5

#17 Precalculus – Hustle
MAΘ National Convention 2017

Find the value of the determinant of the matrix

$$A=\begin{bmatrix} 9/2 & -2 & -7/2 \\ -1 & 1 & 1 \\ -1/2 & 0 & 1/2 \end{bmatrix}.$$

Answer : _____

Round 1 2 3 4 5

#17 Precalculus – Hustle
MAΘ National Convention 2017

Find the value of the determinant of the matrix

$$A=\begin{bmatrix} 9/2 & -2 & -7/2 \\ -1 & 1 & 1 \\ -1/2 & 0 & 1/2 \end{bmatrix}.$$

Answer : _____

Round 1 2 3 4 5

#18 Precalculus – Hustle
MAΘ National Convention 2017

Simplify, where defined: $\dfrac{\dfrac{\cot x \cos x}{1-\sin^2 x}}{\sin x}$

Answer : _____

Round 1 2 3 4 5

#18 Precalculus – Hustle
MAΘ National Convention 2017

Simplify, where defined: $\dfrac{\dfrac{\cot x \cos x}{1-\sin^2 x}}{\sin x}$

Answer : _____

Round 1 2 3 4 5

#18 Precalculus – Hustle
MAΘ National Convention 2017

Simplify, where defined: $\dfrac{\dfrac{\cot x \cos x}{1-\sin^2 x}}{\sin x}$

Answer : _____

Round 1 2 3 4 5

#18 Precalculus – Hustle
MAΘ National Convention 2017

Simplify, where defined: $\dfrac{\dfrac{\cot x \cos x}{1-\sin^2 x}}{\sin x}$

Answer : _____

Round 1 2 3 4 5

#19 Precalculus – Hustle
MAΘ National Convention 2017

The graph of $r = 5\cos(n\theta)$, where n is a positive integer, is a rose with four petals. Find the value of n.

Answer : ______________________

Round 1 2 3 4 5

#19 Precalculus – Hustle
MAΘ National Convention 2017

The graph of $r = 5\cos(n\theta)$, where n is a positive integer, is a rose with four petals. Find the value of n.

Answer : ______________________

Round 1 2 3 4 5

#19 Precalculus – Hustle
MAΘ National Convention 2017

The graph of $r = 5\cos(n\theta)$, where n is a positive integer, is a rose with four petals. Find the value of n.

Answer : ______________________

Round 1 2 3 4 5

#19 Precalculus – Hustle
MAΘ National Convention 2017

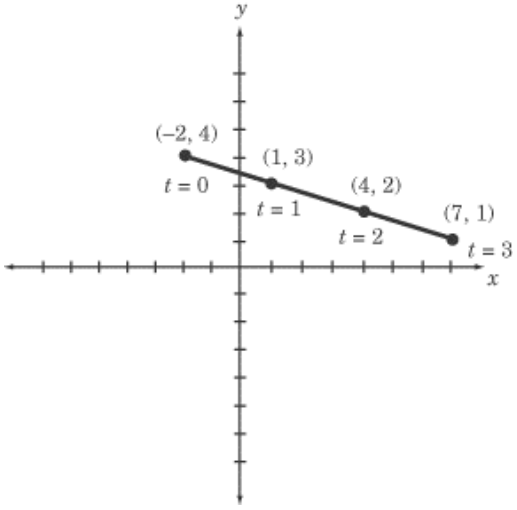
The graph of $r = 5\cos(n\theta)$, where n is a positive integer, is a rose with four petals. Find the value of n.

Answer : ______________________

Round 1 2 3 4 5

#20 Precalculus – Hustle
MAΘ National Convention 2017

Consider the following graph:



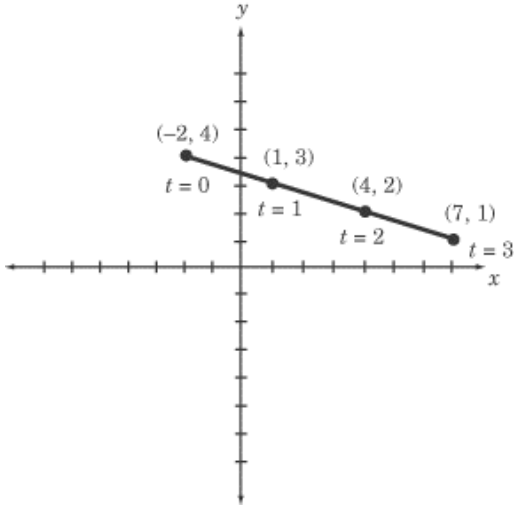
The parametric equations for this graph are $x=3t-2$ and $y=f(t)$, where $0\le t\le 3$. Find $f(t)$.

Answer : _____

Round 1 2 3 4 5

#20 Precalculus – Hustle
MAΘ National Convention 2017

Consider the following graph:



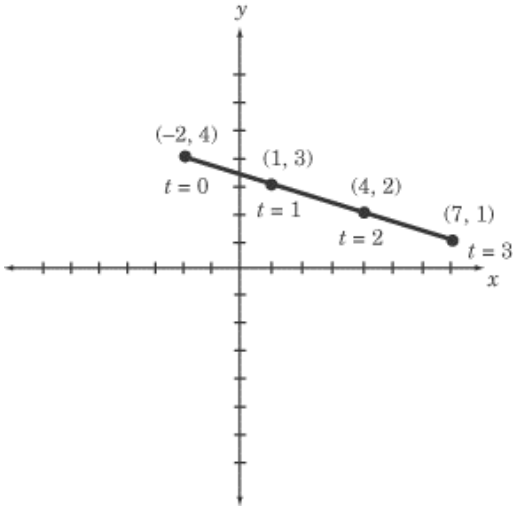
The parametric equations for this graph are $x=3t-2$ and $y=f(t)$, where $0\le t\le 3$. Find $f(t)$.

Answer : _____

Round 1 2 3 4 5

#20 Precalculus – Hustle
MAΘ National Convention 2017

Consider the following graph:



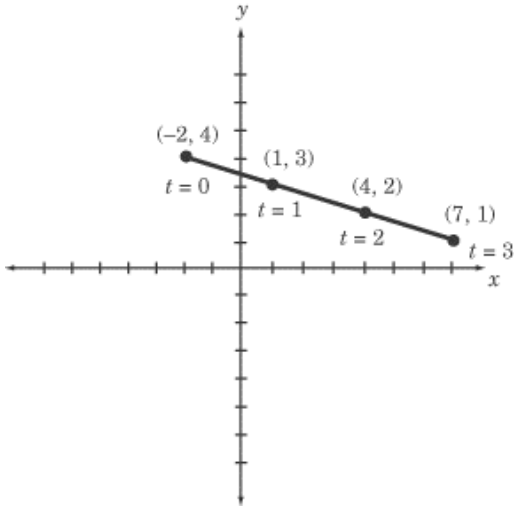
The parametric equations for this graph are $x=3t-2$ and $y=f(t)$, where $0\le t\le 3$. Find $f(t)$.

Answer : _____

Round 1 2 3 4 5

#20 Precalculus – Hustle
MAΘ National Convention 2017

Consider the following graph:



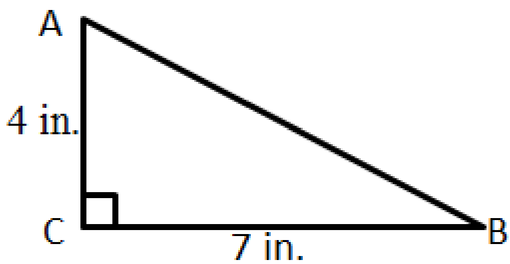
The parametric equations for this graph are $x=3t-2$ and $y=f(t)$, where $0\le t\le 3$. Find $f(t)$.

Answer : _____

Round 1 2 3 4 5

#21 Precalculus – Hustle
MAΘ National Convention 2017

Find the value of $\csc B \cdot \sin A$ using the diagram:

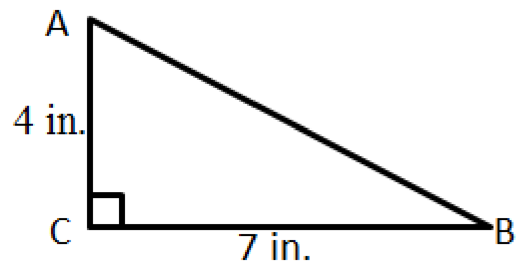


Answer : ____________________

Round 1 2 3 4 5

#21 Precalculus – Hustle
MAΘ National Convention 2017

Find the value of $\csc B \cdot \sin A$ using the diagram:

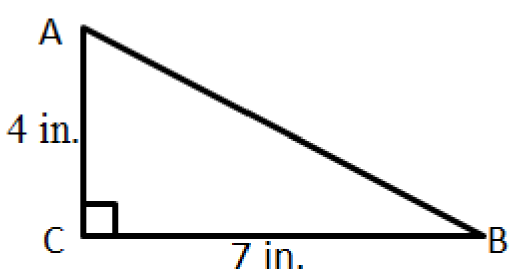


Answer : ____________________

Round 1 2 3 4 5

#21 Precalculus – Hustle
MAΘ National Convention 2017

Find the value of $\csc B \cdot \sin A$ using the diagram:

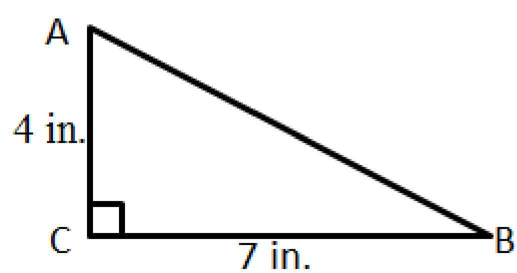


Answer : ____________________

Round 1 2 3 4 5

#21 Precalculus – Hustle
MAΘ National Convention 2017

Find the value of $\csc B \cdot \sin A$ using the diagram:

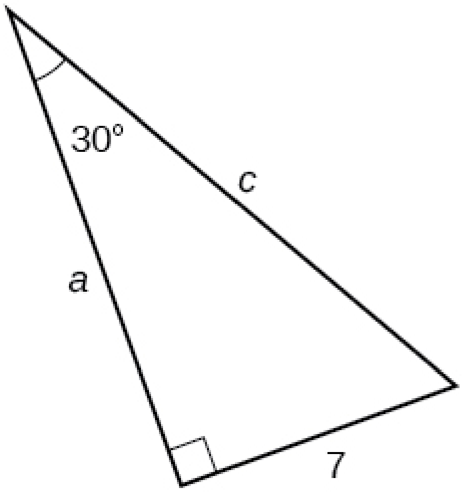


Answer : ____________________

Round 1 2 3 4 5

#22 Precalculus – Hustle
MAΘ National Convention 2017

Find the area enclosed by the triangle:

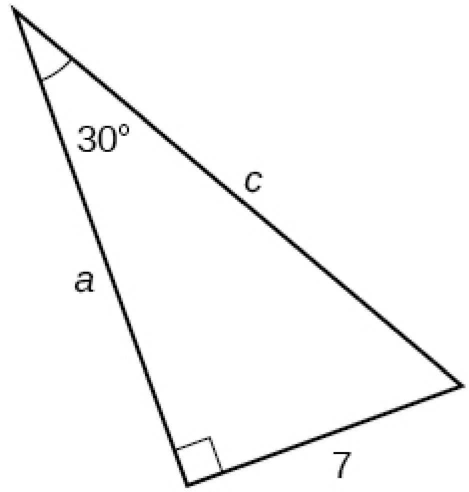


Answer : ______________________

Round 1 2 3 4 5

#22 Precalculus – Hustle
MAΘ National Convention 2017

Find the area enclosed by the triangle:

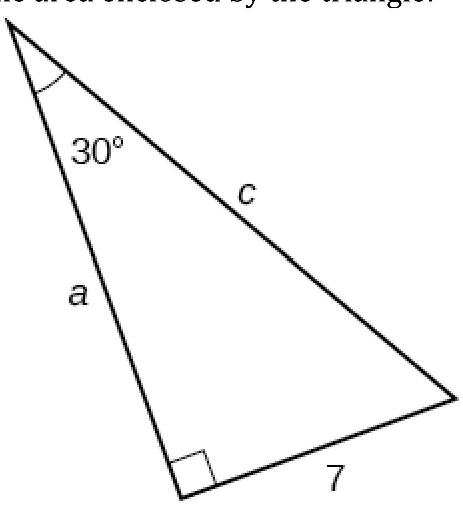


Answer : ______________________

Round 1 2 3 4 5

#22 Precalculus – Hustle
MAΘ National Convention 2017

Find the area enclosed by the triangle:

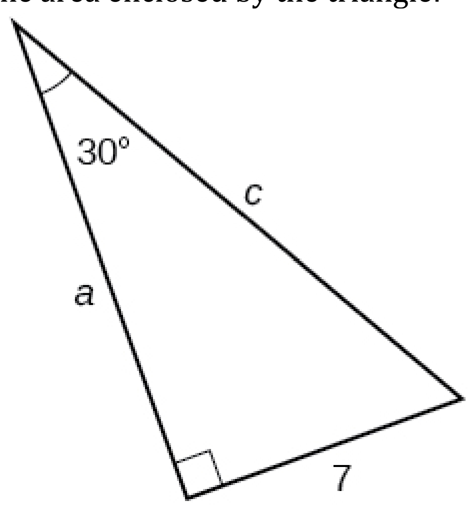


Answer : ______________________

Round 1 2 3 4 5

#22 Precalculus – Hustle
MAΘ National Convention 2017

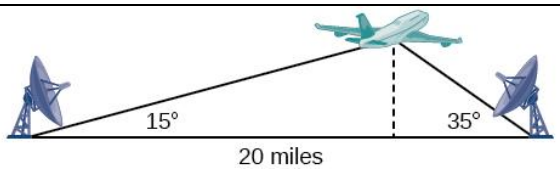
Find the area enclosed by the triangle:



Answer : ______________________

Round 1 2 3 4 5

#23 Precalculus – Hustle
MAΘ National Convention 2017

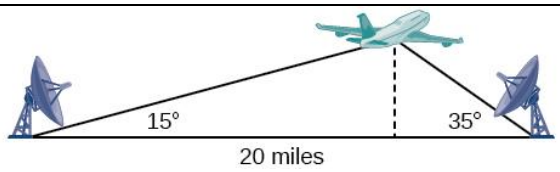


Given that $\tan 75^\circ \approx 3.73$ and $\tan 35^\circ \approx 0.7$, and that the distance between the satellites is 20 miles, find the altitude of the airplane, to the nearest mile.

Answer : _____

Round 1 2 3 4 5

#23 Precalculus – Hustle
MAΘ National Convention 2017

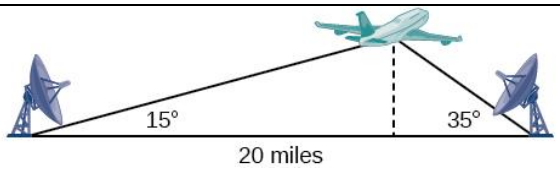


Given that $\tan 75^\circ \approx 3.73$ and $\tan 35^\circ \approx 0.7$, and that the distance between the satellites is 20 miles, find the altitude of the airplane, to the nearest mile.

Answer : _____

Round 1 2 3 4 5

#23 Precalculus – Hustle
MAΘ National Convention 2017

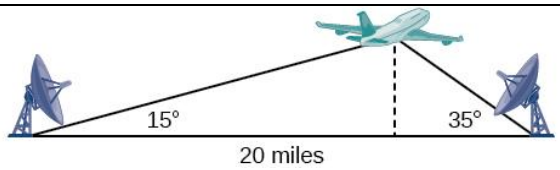


Given that $\tan 75^\circ \approx 3.73$ and $\tan 35^\circ \approx 0.7$, and that the distance between the satellites is 20 miles, find the altitude of the airplane, to the nearest mile.

Answer : _____

Round 1 2 3 4 5

#23 Precalculus – Hustle
MAΘ National Convention 2017



Given that $\tan 75^\circ \approx 3.73$ and $\tan 35^\circ \approx 0.7$, and that the distance between the satellites is 20 miles, find the altitude of the airplane, to the nearest mile.

Answer : _____

Round 1 2 3 4 5

#24 Precalculus – Hustle
MAΘ National Convention 2017

Solve the equation for all solutions in the interval $[0,2\pi)$: $\cos(2x)-\cos x=0$

Answer : _____

Round 1 2 3 4 5

#24 Precalculus – Hustle
MAΘ National Convention 2017

Solve the equation for all solutions in the interval $[0,2\pi)$: $\cos(2x)-\cos x=0$

Answer : _____

Round 1 2 3 4 5

#24 Precalculus – Hustle
MAΘ National Convention 2017

Solve the equation for all solutions in the interval $[0,2\pi)$: $\cos(2x)-\cos x=0$

Answer : _____

Round 1 2 3 4 5

#24 Precalculus – Hustle
MAΘ National Convention 2017

Solve the equation for all solutions in the interval $[0,2\pi)$: $\cos(2x)-\cos x=0$

Answer : _____

Round 1 2 3 4 5

#25 Precalculus – Hustle
MAΘ National Convention 2017

Evaluate: $\langle -2,1\rangle \cdot \langle 1,7\rangle$

Answer : _____

Round 1 2 3 4 5

#25 Precalculus – Hustle
MAΘ National Convention 2017

Evaluate: $\langle -2,1\rangle \cdot \langle 1,7\rangle$

Answer : _____

Round 1 2 3 4 5

#25 Precalculus – Hustle
MAΘ National Convention 2017

Evaluate: $\langle -2,1\rangle \cdot \langle 1,7\rangle$

Answer : _____

Round 1 2 3 4 5

#25 Precalculus – Hustle
MAΘ National Convention 2017

Evaluate: $\langle -2,1\rangle \cdot \langle 1,7\rangle$

Answer : _____

Round 1 2 3 4 5