

Precalculus Team Test

1. Find:  $\sin(75^\circ)$

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Precalculus Team Test

1. Find:  $\sin(75^\circ)$

Precalculus Team Test

2. The letters preceding each equation equals the eccentricity of the conic. List these letters in increasing numerical value.

A:  $3x^2 + 5y^2 + 6x + 8y = -4$

B:  $3x^2 + 6x + 2y + 3y^2 = \pi - 1$

C:  $5x^2 + 2y^2 + \frac{\sqrt{2}}{2} + \frac{\sqrt{3}}{2}y = 4y^2 + \sqrt{2}$

D:  $2x^3 + 2xy^2 + 4x^2y = x\sqrt{\pi}$

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D:  $2x^3 + 2xy^2 + 4x^2y = x\sqrt{\pi}$

Precalculus Team Test

3. Rewrite in terms of only  $x$ 's:  $\cos(\arctan(x) + \arcsin(x))$

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Precalculus Team Test

3. Rewrite in terms of only  $x$ 's:  $\cos(\arctan(x) + \arcsin(x))$

Precalculus Team Test

4. A= shortest distance between lines  $x + y = 1$  and  $2x + 2y = 1$

B= shortest distance between the point  $(1, 3)$  and  $y = x^2$

C= shortest distance between  $y = e^x$  and  $y = \ln(x - 10) + 5$

D= shortest distance between the planes defined by  $x + y + z + 1 = 0$  and  $x + 2y + 2z + 2 = 0$ ?

What is  $(A + B + C) \cdot D$ ?

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Precalculus Team Test:

5. Evaluate:

$$\sum_{k=1}^{12} \cos\left(\frac{\pi \cdot k}{12}\right)$$

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Precalculus Team Test:

5. Evaluate:

$$\sum_{k=1}^{12} \cos\left(\frac{\pi \cdot k}{12}\right)$$

Precalculus Team Test

6. Find the solution(s) to the equation

$$\sin(2x) = \cos\left(\frac{x}{2}\right).$$

in the interval  $[0^\circ, 180^\circ]$ .

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Precalculus Team Test

6. Find the solution(s) to the equation

$$\sin(2x) = \cos\left(\frac{x}{2}\right).$$

in the interval  $[0^\circ, 180^\circ]$ .

Precalculus Team Test

7. Find the number of positive integers  $m$  less than 2011 that satisfy the condition that

$$\sin(m^\circ) \cdot \cos(m^\circ)$$

is rational.

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Precalculus Team Test

7. Find the number of positive integers  $m$  less than 2011 that satisfy the condition that

$$\sin(m^\circ) \cdot \cos(m^\circ)$$

is rational.

Precalculus Team Test

8. Completely simplify

 $i^{i^k}$ 

where  $i^2 = -1$  and  $k = \frac{i^{2012} - i^{4013} + i^{5010} + i}{i^3 - i^{17}} - \frac{i^3 + i}{i^2 + i}$ .

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Precalculus Team Test

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Precalculus Team Test

9. In which quadrant does the point  $(\sin(3) + \sin(4), \cos(4) + \cos(5))$  lie? (Note that the angle measures are in radians.)

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Precalculus Team Test

9. In which quadrant does the point  $(\sin(3) + \sin(4), \cos(4) + \cos(5))$  lie? (Note that the angle measures are in radians.)

Precalculus Team Test

10. In a certain football game, 7 points are awarded for a touchdown, and 3 points are awarded for a field goal. Assuming that an infinitely long game could be possible, what is the highest score that is not obtainable (even in such a game)?

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Precalculus Team Test

10. In a certain football game, 7 points are awarded for a touchdown, and 3 points are awarded for a field goal. Assuming that an infinitely long game could be possible, what is the highest score that is not obtainable (even in such a game)?

Precalculus Team Test

11. Add and simplify as one fraction:

$$\pi + \frac{3\pi}{8} + \frac{5\pi}{12} + 4\pi + \frac{2\pi}{3} + \frac{1}{\pi} + \frac{\pi}{2} + \frac{\pi^2}{4} + \frac{4\pi}{5} + 2\pi + \frac{1}{2}$$

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Precalculus Team Test

13. Line segment  $AB$  and  $AC$  are tangent to Circle  $D$  at  $B$  and  $C$  respectively. Line segment  $AD$  intersects Circle  $D$  at  $E$ .  $AD=6$ . Angle  $CAB$  is 60 degrees. What is the perimeter of triangle  $ABD$ ?

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Precalculus Team Test

15.  $A$ 's cofactor matrix is:

$$\begin{bmatrix} 1 & -3 \\ 4 & 2 \end{bmatrix}$$

Let  $A^T$  denote  $A$ 's transposed matrix and  $A^{-1}$  denote  $A$ 's inverse. Find  $|A \cdot A^T \cdot A^{-1}|$ .

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