

1.

Let W = the minimum value of $y = 5 - 3\sin\left(x + \frac{\pi}{4}\right)$

X = the y-intercept of $y = 2 + e^x$

$$Y = \log_5 \frac{1}{25}$$

$$Z = \lim_{x \rightarrow \infty} \frac{3x+1}{x-2}$$

FIND the value of $W + X + Z - Y$

3. Write $(\sqrt{3} - i)^4$ in standard form $a + bi$.

2. Simplify:

$$\frac{\frac{x^3 - 1}{2x^2 + x - 3}}{\frac{3x^2 + x - 2}{6x^2 + 5x - 6}}$$

4. For each of the following statements, assign the value of 1 to a true statement and assign the value of -1 to a false statement.

◇ The vectors $\vec{v} = 4i + 6j$ and $\vec{w} = 8i - 3j$ are orthogonal

◇ The graph of $r = 2\cos(4\theta)$ is a rose curve.

◇ 60° , 1140° , and -1020° are co-terminal angles.

◇ If $f(x) = \sin\left(x - \frac{\pi}{2}\right)$ and $g(x) = -\cos(x)$, the graphs of $f(x)$ and $g(x)$ are the same.

FIND THE SUM OF THE VALUES ASSIGNED TO THESE STATEMENTS.

5. Write $\frac{2x-17}{x^2-3x-10}$ as the sum of 2 fractions with 1st degree denominators.

7.

$$A = \log_2 4 \cdot \log_4 16 \cdot \log_{16} 128$$

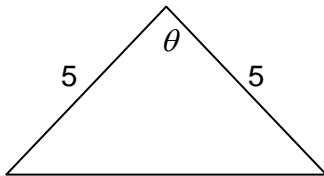
$$B = \log_{\sqrt{3}} 9 + \log_{\sqrt[3]{3}} 9$$

$$C = \ln \sqrt{e}$$

$$D = \log_4 384 - \log_4 6$$

What is the product of ABCD?

6. What angle θ between two edges of length 5 will result in an isosceles triangle with the largest possible area?



8. A certain base-10 number can be expressed in base-3 as $10m$ and it can be expressed in base-5 as $m1$ where m is an integer. Find the original base-10 number.

9.

$$A = (\sqrt{987654} + \sqrt{987651})^4 (\sqrt{987654} - \sqrt{987651})^4$$

B = the number of digits in $2^{23} \cdot 5^{19}$

Find $A + B$

11.

What is the probability that $(\cos x)$ is less than $\frac{\sqrt{2}}{2}$ if

$$0 \leq x \leq 2\pi$$

10. Which of the following expressions below cannot be simplified to 1?

A. $\sin^2 x \cdot \cot^2 x + \sin^2 x$

B. $\csc^2 x - \cot^2 x$

C. $\frac{1}{1 + \sin x} + \frac{1}{-1 - \sin x}$

D. $\frac{\cos^4 x - \sin^4 x}{\cos 2x}$

12.

$$\sum_{10}^{50} (4) = k$$

A circle of radius k is inscribed in a square. Give the length of the diagonal of the square.

13.

Is more work done by a force of 3 pounds acting in a direction of 60° to the horizontal in moving an object 2 feet horizontally,

or

Is more work done by a force of 0.9 pounds acting in a direction of 35° to the horizontal in moving an object 4 feet horizontally?

14.

Let $f(x) = \frac{1}{x+1}$ and $g(x) = \frac{x+6}{x-2}$. The domain of $f(g(x))$ is

$(-\infty, A) \cup (A, B) \cup (B, +\infty)$. Give the value of $\frac{A}{B}$

1. 10

2. $\frac{x^2 + x + 1}{x + 1}$

3. $-8 - 8i\sqrt{3}$

4. 2

5. $\frac{3}{x+2} + \frac{-1}{x-5}$

6. 90°

7. 105 (since $A=7$, $B=10$, $C=1/2$, $D=3$)

8. 11

9. 102 (since $A=81$ and $B=21$)

10. C (it simplifies to 0)

11. $3/4$

12. $328\sqrt{2}$

13. 3 pounds, 60 degrees, 2 feet (3 vs. 2.9)

14. -1