

ROUND 1

What is the coefficient of x^2y^3 in the expansion of $(2x - y)^5$?

ANSWER -40

ROUND 2

What is the algebraic sum of the solutions to the equation:

$$(x^3 - 1)(2x + 1)(3x - 5)(x - 3)(x^2 - 5x - 6) = 0$$

ANSWER $\frac{55}{6}$

ROUND 3

What is the y-intercept of the line passing through the center of $x^2 + y^2 + 6x - 8y = 0$ whose slope is 2?

ANSWER 10

ROUND 4

What is the number of digits in $4^{20}5^{33}$ (when written in the usual base 10 form)?

ANSWER 36

ROUND 5

If a , b , and c are constants and $(ax-3)(b-4x) = 12x^2 + cx - 15$, then what is the value of c ?

ANSWER -3

ROUND 6

What is the $\arctan\left(\tan\left(\frac{3\pi}{4}\right)\right) + \arcsin\left(\sin\left(\frac{7\pi}{6}\right)\right)$?

ANSWER $-\frac{5\pi}{12}$

ROUND 7

What is the largest possible distance between two points, one on the sphere of radius 24 with center $(5,17,61)$ and the other on the sphere of radius 19 with center $(9,5,64)$?

ANSWER 56

ROUND 8

The second-degree polynomial function f has zeros of -1 and 2 . If $f(0) = -6$, what is $f(3)$?

ANSWER 12

ROUND 9

Find xy if $\sqrt[3]{x^2 + y^2} = 5$ and $(x - y)^2 = 153$.

ANSWER -14

ROUND 10

If $m = 4$ and $t = 3$, find: $\frac{(m+t)(m-t)(m^2 - mt + t^2)}{t - m} - \frac{t^2 - m^2}{m - t}$

ANSWER -84

ROUND 11

$G(x)$ is the function that results from shifting $f(x) = |x|$ three units to the left and two units down. What is the sum of the solutions of $G(x) = 5$?

ANSWER -6

ROUND 12

An ordered pair (m, n) of non-negative integers is called "simple" if the addition $m+n$ in base 10 requires no carrying. Find the number of simple ordered pairs of non-negative integers that sum to 2419.

ANSWER 300

ROUND 13

Anne sells an item at \$5 less than the list price and receives 10% of her selling price as her commission. Bob sells the same item at \$15 less than the list price and receives 20% of his selling price as his commission. If they both get the same commission, then what is the list price?

ANSWER \$25

ROUND 14

If $\cot(t) = \frac{2}{5}$, $0 \leq t \leq \frac{\pi}{2}$, what is $\cos(-t) + \sin(-t) + \sec(t)$ when expressed as a fraction in reduced terms.

ANSWER $\frac{23}{2\sqrt{29}} = \frac{23\sqrt{29}}{58}$

ROUND 15

A ball was floating in a lake when the lake froze. The ball was lifted from the ice (without breaking the ice) leaving a hole 24 cm across at the top and 8 cm deep. What was the radius of the ball (in centimeters)?

ANSWER 13

ROUND 16

If a is the largest solution of $10x^2 - x - 24 = 0$ and b is the smallest solution of $x^3 + x^2 - 25x - 25 = 0$, what is $2a - b$?

ANSWER $41/5 = 8.2$