ROUND 1

If $y - x = 11$, find $\dfrac{x+y}{x^2-y^2}$.

ANSWER -1/11

ROUND 2

The graph of $y = x^2$ is shifted 3 units to the right and 4 units down. What is an equation of the new graph?

ANSWER $y = (x-3)^2 - 4$, $y = x^2 - 6x + 5$

ROUND 3

If $\log_b(13) = x$, $\log_b(25) = 2y$, and $\log_b(27) = -3z$, what is $\log_b(195)$?

ANSWER $x + y - z$

ROUND 4

Simplify completely: $i^{5157} + \dfrac{i^{27} + i^2\left(\sqrt[4]{81}\right)}{3+i}$.

ANSWER i - 1

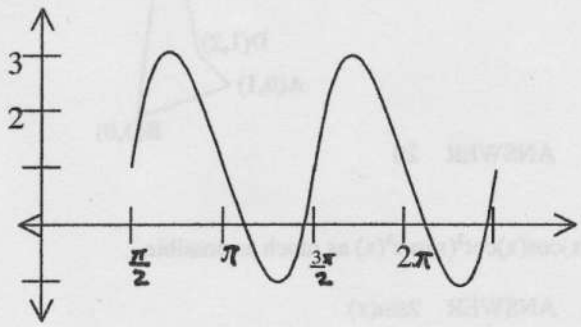
ROUND 5

An isosceles triangle with base of length $\sqrt{20}$ has area equal to 15. Find the product of the lengths of the two long sides of the triangle.

ANSWER 50

ROUND 6

What are the amplitude and the period of the sine function in the graph shown?



ANSWER Amplitude: 2, Period: π

ROUND 7

List all integers that are solutions to both inequalities: $|3x + 4| > 7$ and $-9 < 2x + 1 < 6$.

ANSWER -4, 2

ROUND 8

Roll three standard six-sided dice. Compute the product of the three numbers showing on the top faces of the dice. What is the probability that this product is less than five?

ANSWER 13/216

ROUND 9

Find all solutions of x: $\dfrac{x^3+3x^2+2x}{x+3}=\dfrac{6x+12}{x+3}$.

ANSWER 2, -2

ROUND 10

Find the midpoint of the line segment between the x-intercept of the graph of $2x + 3y = 6$ and the y-intercept of the graph of $y + 3 = (x - 2)^2$

ANSWER (3/2, 1/2)

ROUND 11

What is the complete solution of $x^2-\left(\pi+\sqrt{2}\right)x+\pi\sqrt{2}>0$?

ANSWER $\left(-\infty,\sqrt{2}\right)\cup\left(\pi,\infty\right)$

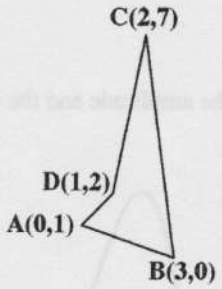
ROUND 12

Find the value of x that satisfies the equation: $\left(8^{\frac{3}{x}}\right)\left(32^{\frac{1}{x}}\right)=\dfrac{\left(2^{\frac{-1}{x}}\right)\left(8^{\frac{1}{x}}\right)}{\left(\frac{1}{2}\right)^{-3}}$.

ANSWER $x = -4$

ROUND 13

The four vertices A(0,1), B(3,0), C(2,7), and D(1,2) can be connected in three different ways to form a quadrilateral depending on the order in which the points are connected. Quadrilateral ABCD is shown, but there are also ABDC and ADBC. Find the sum of the areas of the three quadrilaterals.



ANSWER 20

ROUND 14

Simplify $\sin(x)\cos^2(x)\tan^2(x)\csc^2(x) + \sin^3(x)\cos(x)\cot^2(x)\sec^3(x)$ as much as possible.

ANSWER $2\sin(x)$

ROUND 15

Find all solutions: $\sqrt{x^2}=x^2+7x+5$.

ANSWER $x=-4\pm\sqrt{11}$

ROUND 16

A drawer contains eight socks that are identical except for color. There are two black socks, two blue socks, two brown socks, and two white socks. The socks are randomly strewn in the drawer. In darkness, we reach in and randomly select four socks from the drawer. What is the probability that we have selected one sock of each color?

ANSWER 8/35