PoTW 27: Week of 1-21-2021

Problem of the Week at shsmathteam.com

Submission form: link to submit

For hints: andliu22@students.d125.org

Alternatively, you can message Andrew Liu on Facebook Messenger. Please don't be afraid to reach out for help, asking for hints is heavily encouraged if you feel stuck.

Problem of the Week #27: Wait. It's coordinates? It always has been...

Algebra

Let a and b be positive real numbers with $a \geq b$. Let ρ be the maximum possible value of $\frac{a}{b}$ for which the system of equations

$$a^2 + y^2 = b^2 + x^2 = (a - x)^2 + (b - y)^2$$

has a solution (x, y) satisfying $0 \leq x < a$ and $0 \leq y < b$. Then ρ^2 can be expressed as a fraction $\frac{m}{n}$, where m and n are relatively prime positive integers. Find $m + n$.