NAME:

Problem 1 (3 points):
Find the equation of the line that passes through the points $(2, 3)$ *and* $(4, -1)$ *in* **slope-intercept form**.

Solution: The slope of the line is $m = \frac{-1-3}{4-2} = \frac{-4}{2} = -2$. Then in point slope form we can write the equation of the line either as $y - 3 = -2(x - 2)$ by using the point $(2, 3)$ or as $y + 1 = -2(x - 4)$ by using the point $(4, -1)$. Converting either expression to slope intercept form we obtain

$$y = -2x + 7$$

Problem 2 (3 points): *Consider the equation* $y^2 = x^2 - 1$

(a) Find the x *coordinates of all* x *intercepts of the equation, if any. Write "NONE" if there are no* x *intercepts.*

Solution: To find the x-intercepts, we plug in $y = 0$ to obtain $0 = x^2 - 1$ and solve for x. We then factor the expression to obtain $0 = (x^2 - 1) = (x - 1)(x + 1)$ and so the x coordinates of the x intercepts are -1 and 1.

(b) Find the y *coordinates of all* y *intercepts of the equation, if any. Write "NONE" if there are no* y *intercepts.*

Solution: Plugging in $x = 0$ we obtain the equation $y^2 = -1$, which has no solution. Therefore there are no y intercepts.

Problem 3 (3 points): *Find the center and radius of the circle given by the equation*

$$x^2 + y^2 - 6x + 5 = 0$$

Solution: We proceed by separating out the x and y terms and then completing the square in x. We do not need to complete the square in y because the y term is already expressed as a perfect square.

$$\begin{aligned} (x^2 - 6x) + y^2 &= -5 \\ (x^2 - 6x + 9) + y^2 &= -5 + 9 \\ (x - 3)^2 + y^2 &= 4 \\ (x - 3)^2 + (y - 0)^2 &= 2^2 \end{aligned}$$

So the center of the circle is $(3, 0)$ and the radius of the circle is 2.

Problem 4 (1 point): *Saying that* $\sqrt{a^2 - b^2} = a - b$ *is (circle one:)*

CORRECT *A VITAL ERROR*

Solution: The above operation is a **VITAL ERROR**. While it is correct to distribute powers across a product or quotient, it is incorrect to distribute them across a sum or difference.