Name:

1. Let $f(x, y) = x^2 + y^4$. Assuming that the equation $x^2 + y^4 = 5$ implicitly defines $y = g(x)$ near the point $(2, 1)$, use the result $\dfrac{dy}{dx} = -\dfrac{F_x(x, y)}{F_y(x, y)}$ to find the equation of the tangent line to the curve $x^2 + y^4 = 5$ at the point $(2, 1)$.

2. Recall that a normal vector for the tangent plane to a surface $z = f(x, y)$ at a point $(a, b, f(a, b))$ is given by $\vec{n} = \langle f_x(a, b), f_y(a, b), -1\rangle$. We say that a plane is horizontal if its normal vector is parallel to $\mathbf{k} = \langle 0, 0, 1\rangle$. What can you say about $\nabla f(a, b)$ if the tangent plane to $z = f(x, y)$ at the point $(a, b, f(a, b))$ is horizontal?

If you've drawn a blank on Question 2, or you've finished early, draw a cat here: