NAME: _____ Panther ID: _____

Quiz 2

To receive credit you MUST SHOW ALL YOUR WORK. Answers which are not supported by work will not be considered.

1. (6 pts) Compute the derivative of each of the following functions (3pts each). You **don't** have to simplify.

(a) $y = \tan^4(\sqrt{x}) = \left(\tan(\sqrt{x})\right)^4$

$y' = 4 \cdot \tan^3(\sqrt{x}) \cdot \sec^2(\sqrt{x}) \cdot \frac{1}{2\sqrt{x}}$

(b) $y = \frac{x^2+2}{\cos(3x)}$

$y' = \frac{2x \cdot \cos(3x) - (x^2+2)(-\sin(3x)\cdot 3)}{\cos^2(3x)}$

$y' = \frac{2x \cdot \cos(3x) + (x^2+2)(\sin(3x)\cdot 3)}{\cos^2(3x)}$

2. (5 pts) Use implicit differentiation to find the equation of the tangent line to the curve $x^3 + y^3 = 3xy^2 + 1$ at the point $(1, 3)$.

Product rule

$3x^2 + 3y^2 \cdot y' = 3y^2 + 3x \cdot (2y \cdot y') + 0$

$3x^2 + 3y^2 \cdot y' = 3y^2 + 6xy \cdot y'$

Plug $x_0 = 1$ and $y_0 = 3$

$3 \cdot 1 + 3 \cdot 3^2 \cdot y' = 3 \cdot 3^2 + 6 \cdot 1 \cdot 3 \cdot y'$

$3 + 27y' = 27 + 18y'$

$27y' - 18y' = 27 - 3$

$9y' = 24$

$y' = \frac{24}{9} = \frac{8}{3} = m$ slope

point - slope formula

$y - y_0 = m(x - x_0)$

$y - 3 = \frac{8}{3}(x - 1)$

$y = \frac{8}{3}(x-1) + 3$

$y = \frac{8}{3}x - \frac{8}{3} + 3$

$\boxed{y = \frac{8}{3}x + \frac{1}{3}}$