Math 31 - Quiz 1.4 - PRSD VC

March 1 2019 Name _____

Find the equation of the tangent line to the implicitly defined curve

$x^2y + 6xy^3 = 2x - 5y^2 + 2$ at the point $(-1, 0)$.

Solution:

$$\begin{aligned} x^2y + 6xy^3 &= 2x - 5y^2 + 2 \\ 2xy + x^2\frac{dy}{dx} + 6y^3 + 6x(3y^2)\frac{dy}{dx} &= 2 - 10y\frac{dy}{dx} \\ (x^2 + 18xy^2 + 10y)\frac{dy}{dx} &= 2 - 2xy - 6y^3 \\ \frac{dy}{dx} &= \frac{2 - 2xy - 6y^3}{x^2 + 18xy^2 + 10y} \end{aligned}$$

At the point $(-1, 0)$ the slope is $\dfrac{2 - 0 - 0}{1 + 0 + 0} = 2$.

The equation of the tangent line is

$$\begin{aligned} y &= 2(x + 1) \\ &= 2x + 2 \end{aligned}$$