

Key

Elements of Calculus I, MATH 180 Quiz 5
Janet Vassilev

(1) Find the equation of the tangent line to $x^2 + y^3 = 9$ at the point $(1, 2)$.

Full 5 points for this

$$2x + 3y^2 \frac{dy}{dx} = 0 \quad \text{so } \frac{dy}{dx} = -\frac{2x}{3y^2}$$
$$\text{at } (1, 2) \quad \frac{dy}{dx} = \frac{-2}{3(2)^2} = -\frac{1}{6}$$

so the tangent line is

$$y - 2 = -\frac{1}{2}(x - 1) \quad \text{or}$$
$$y = -\frac{1}{2}x + \frac{5}{2}$$

(2) Use implicit differentiation to determine $\frac{dy}{dx}$ for the equation $xy - 1 = \sqrt{x + 2y}$.

5 pts

$$x \frac{dy}{dx} + y = \frac{1}{2}(x + 2y)^{-1/2} (1 + 2 \frac{dy}{dx})$$
$$(x - (x + 2y)^{-1/2}) \frac{dy}{dx} = \frac{1}{2}(x + 2y)^{-1/2} - y$$
$$\frac{dy}{dx} = \frac{\frac{1}{2}(x + 2y)^{-1/2} - y}{x - (x + 2y)^{-1/2}}$$