Names: _____ _____ _____

Activity #5: Differentiation III **Calculus I**

1. Are there any points on the curve

$$y = \frac{10}{3}x + \frac{1}{4x+3}$$

where the tangent line has slope -2/3? If so, find them.

2. Find the points on the curve $y = 2x^3 - 3x^2 - 12x + 20$ where the tangent line is

   (a) horizontal.

   (b) perpendicular to $y = 1 - \frac{x}{24}$.

   (c) parallel to $y = \sqrt{2} - 12x$.

3. Find equations for the tangent and normal lines to the curve $xy + 2x - 5y = 2$ at $(3, 2)$.

4. Find $\frac{dy}{dx}$ for the following functions by implicit differentiation.

   (a) $\sqrt{xy} = 1$

   (b) $y^2 = \dfrac{x}{x+1}$

   (c) $y^3 + 4xy - 3x^2 = 2$

5. Suppose y is a twice-differentiable function defined implicitly by $x^3 + y^3 = 1$. Find a formula for $\frac{d^2y}{dx^2}$.