Quiz 8

MAT 201, SPRING 2017

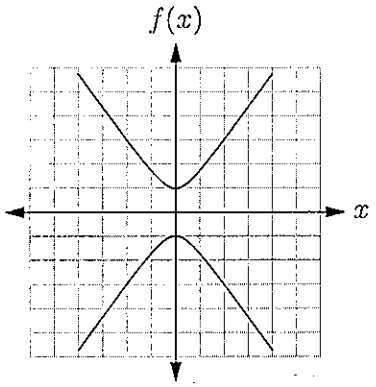
NAME:

Find the derivative of each function.

1. (10 points) (a) The hyperbola shown in the graph is given by the equation

$$y^2 - 2x^2 = 1.$$

Use implicit differentiation to find a formula for the derivative $\frac{dy}{dx}$.



$$\frac{d}{dx}(y^2 - 2x^2) = \frac{d}{dx}(1)$$

$$2y\frac{dy}{dx} - 4x = 0$$

$$2y\frac{dy}{dx} = 4x$$

$$\boxed{\frac{dy}{dx} = \frac{2x}{y}}$$

(b) Find the equation of the tangent line passing through the point $(2, -3)$.

Slope from derivative:

$$\frac{dy}{dx} = \frac{2(2)}{-3} = -\frac{4}{3}$$

Point-slope form:

$$y - (-3) = -\frac{4}{3}(x - 2)$$

$$y + 3 = -\frac{4}{3}x + \frac{8}{3}$$

$$\boxed{y = -\frac{4}{3}x - \frac{1}{3}}$$

2. (5 points) Give the derivative of $y = \ln x$.

$$y' = \frac{1}{x}$$

3. (5 points) Give the derivative of $y = 4^x$.

$$y' = (\ln 4)\, 4^x$$