

Math 131 - Quiz 7

March 25, 2026

Name key

Score _____

Show all work to receive credit. Supply explanations where necessary.

1. (6 points) Assume that y is implicitly defined as a function of x by the equation $xy + y^3 = 2x - 1$. Find an equation for the normal line passing through $(2, 1)$.

$$\frac{d}{dx}(xy + y^3) = \frac{d}{dx}(2x - 1)$$

$$y + x \frac{dy}{dx} + 3y^2 \frac{dy}{dx} = 2$$

$$(x + 3y^2) \frac{dy}{dx} = 2 - y$$

$$\frac{dy}{dx} = \frac{2 - y}{x + 3y^2}$$

$$\left. \frac{dy}{dx} \right|_{(2,1)} = \frac{2-1}{2+3} = \frac{1}{5}$$

$$\text{SLOPE OF NORMAL LINE} = -\frac{5}{1} = -5$$

POINT: $(2, 1)$

NORMAL LINE:

$$y - 1 = -5(x - 2) \quad \text{or} \quad y = -5x + 11$$

2. (1 point) Explain why $f(x) = |x|$ does not have an inverse.

$f(x) = |x|$ IS NOT A ONE-TO-ONE FUNCTION.

ITS GRAPH DOES NOT PASS THE HORIZONTAL LINE TEST.

3. (2 points) Let $g(x) = x^3 + 5x - 8$. Find $g^{-1}(-2)$.

$$g^{-1}(-2) = x \iff g(x) = -2$$

$$x^3 + 5x - 8 = -2 \implies x = 1 \implies g^{-1}(-2) = 1$$

4. (1 point) Shown below are some values for the function f . Assuming that f has an inverse, determine $f^{-1}(5)$.

$$f(1) = -7, \quad f(5) = 19, \quad f(3) = -5, \quad f(-5) = 4, \quad f(0) = 2, \quad f(8) = 5$$

$$f^{-1}(5) = 8$$