

IMPLICIT FUNCTIONS (3.7)

1. Which of the following equations represents a function of x , only a relation, or nonsense?

A. $\cos(xy) = x^2 + y^2$ B. $e^x y + 4x^2 = 7$ C. $x^2 + y^2 + 3 = 0$ D. $y = \ln(\ln(\sin x))$

2. Consider $x^3 + 4y^2 = 3$.

A. Find $\frac{dy}{dx}$

B. Find points where the tangent line is vertical. Is horizontal.

C. Find the equation of the tangent line at $(-1, 1)$.

3. Find $\frac{dy}{dx}$ for $3^x + y^2 \ln(x^3 + 1) = 4y^2 + 10$.

4. Find $\frac{dz}{dt}$ for $6tz^3 - 4t = 7e^z$.

5. Find $\frac{d\theta}{dx}$ for $\tan^2(\theta) = x^3 + 1$.

6. Find $f'(x)$ for $f(x) = x^x$.

HYPERBOLIC FUNCTIONS (3.8)

1. When a particular cable hangs between two poles the shape is a catenary, $f(x) = a \cosh\left(\frac{x}{a}\right)$ where a is the distance from the sag of the cable to the ground. Suppose the poles are 100 feet apart. Find the slope where the cable meets the pole if the sag is 30 feet.
2. If you fall through a medium so that resistance is proportional to the square of your velocity then the distance you fall as a function of time is given by $x = k \ln(\cosh(ct))$. Find a formula for your velocity.
3. Simplify the expression $\sinh(\ln(2t))$.