

Question 6

Consider the equation defined implicitly:

$$x^2 + y^2 + \ln(y) = 10$$

- (a) Use implicit differentiation to find $\frac{dy}{dx}$.
- (b) Find the slope of the tangent line at the point $(3, 1)$.

Question 6 - Solution

The logarithm requires $y > 0$. Differentiating gives

$$2x + 2yy' + y'/y = 0, \quad y' = \frac{-2x}{2y + 1/y}.$$

At $(3, 1)$, $3^2 + 1^2 + \ln 1 = 10$, so the point is on the curve.

The denominator is 3, giving $y'(3) = -2$.