

Note: exam problem numbering is off by 1

9. [5 points]

A curve is implicitly defined by the equation

$$\ln(kx) - 3xy^2 = \pi,$$

where k is a constant. Compute $\frac{dy}{dx}$. Your answer may include k . Show every step of your work.

Solution: Taking the derivative, we have

$$\frac{1}{x} - 3y^2 - 6xyy' = 0.$$

Thus

$$\frac{1}{x} - 3y^2 = 6xyy',$$

and so

$$y' = \frac{\frac{1}{x} - 3y^2}{6xy}.$$

Answer: $\frac{dy}{dx} = \frac{\frac{1}{x} - 3y^2}{6xy}$