

5.12 Behaviors of Implicit Relations

Calculus

Name: _____

CA #1

Consider the given differential equation $\frac{dy}{dx}$, where $y = f(x)$ is a particular solution with a given point. For each problem, determine if f has a relative minimum, a relative maximum, or neither at the given point. Justify your answer.

1. $\frac{dy}{dx} = \cos x - 2y$ where $f\left(\frac{\pi}{2}\right) = 3$.

2. $\frac{dy}{dx} = x^3 - y^2$ where $f(1) = 1$.

3. $\frac{dy}{dx} = \frac{y}{1-x} + x$ where $f(3) = 6$.

Consider the curves in the xy -plane for each problem. At the point given point, is the curve increasing or decreasing? Justify your answer.

4. $x^2 + y^2 - 3xy = 11$ at $(2, -1)$

5. $e^x = \cos y$ at $\left(0, \frac{3\pi}{2}\right)$

1. Neither because $\frac{dy}{dx} > 0$ at the point.	2. Rel min because $\frac{dy}{dx} = 0$ and $\frac{d^2y}{dx^2} > 0$.	3. Rel min because $\frac{dy}{dx} = 0$ and $\frac{d^2y}{dx^2} > 0$.	4. Increasing because $\frac{dy}{dx} < 0$.	5. Increasing because $\frac{dy}{dx} < 0$.
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