

## 5.12 Behaviors of Implicit Relations

Calculus

Name: \_\_\_\_\_

**CA #2**

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.  $\frac{dy}{dx} = \ln x + xy$  where  $f(1) = -2$ .

2.  $\frac{dy}{dx} = e^x - y$  where  $f(0) = 1$ .

3.  $\frac{dy}{dx} = \sin x + y^2 - 9$  where  $f(\pi) = 3$ .

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.  $xy = -12$  at  $(-4, 3)$

5.  $x = y\sqrt{y^3 + 1}$  at  $(6, 2)$

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 max 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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