What you'll learn about

- Implicitly Defined Functions
- Lenses, Tangents, and Normal Lines
- Derivatives of Higher Order
- Rational Powers of Differentiable Functions

EQ: What is implicit differentiation, and how do we apply it?

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Implicit differentiation allows us to find derivatives of functions that are not defined or written explicitly as a function of a single variable.
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## Example Implicitly Defined Functions

$$
\text { Find } \frac{d y}{d x} \text { if } x^{3}-7 x^{2} y^{3}+4 y^{2}=-16
$$

$$
3 x^{2}-7 x^{2}\left(3 y^{2} \frac{d y}{d x}\right)+(-14 x) y^{3}+8 y \frac{d y}{d x}=0
$$

$$
-21 x^{2} y^{2} \frac{d y}{d x}+8 y \frac{d y}{d x}=14 x y^{3}-3 x^{2}
$$

$$
\frac{d y}{d x}=\frac{14 x y^{3}-3 x^{2}}{8 y-21 x^{2} y^{2}}
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