

Section 3.6, Implicit differentiation

Exercise 1. Find an equation of the tangent line to the curve $y^2 = x^3(2 - x)$ at the point $(1, 1)$.

Exercise 2. Find $\frac{dy}{dx}$ using the implicit differentiation of

1. $y^5 + 3x^2y^3 + 5x^6 = 8$.

2. $x^{2/3} + y^{2/3} = 4$ at $(-3\sqrt{3}, 1)$.

3. $\cos(x - y) = y \sin 3x - x \sin y$.

4. $\frac{y}{y-3} = \sqrt{x+y}$

Exercise 3. (43p199) Find all points on the curve

$$x^2y^2 + xy = 2$$

where the slope is -1 .

Exercise 4. (20p198) If

$$(g(x))^2 + 12x = x^2g(x) \quad \text{and} \quad g(4) = 12,$$

find $g'(4)$.

Definition: Two curves are called orthogonal if at each point of intersection their tangent lines are perpendicular.

Exercise 5. Show that the given curves are orthogonal

1.

$$2x^2 + y^2 = 3, \quad x = y^2$$

2.

$$x^2 - y^2 = 5, \quad 4x^2 + 9y^2 = 72$$