

AP Calculus AB - Implicit Differentiation - Test

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Name: _____ Class: _____ Date: ____/____/____

This test checks implicit differentiation, slopes of curves, tangent lines, horizontal and vertical tangents and second derivatives (AP Calculus AB, 3.2). It has 8 questions worth 20 points in total. Allow 45 minutes, work without notes, and show all work, since justification earns points on the AP exam.

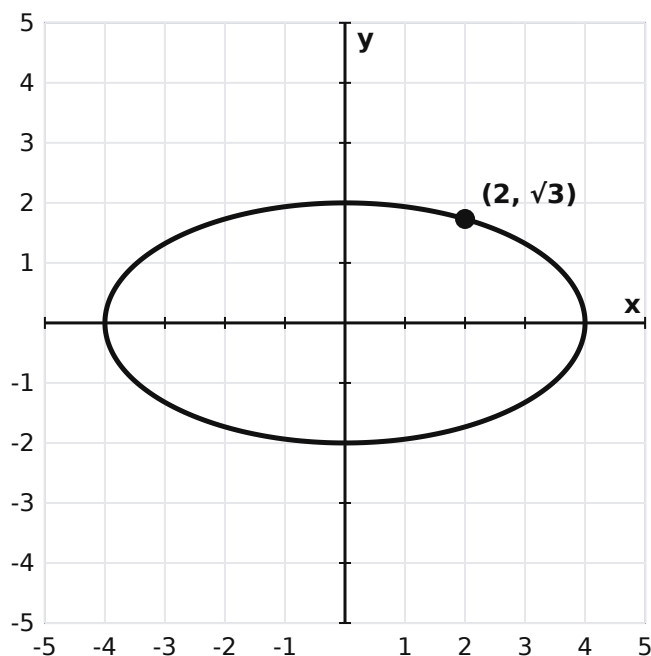
About this test

- Grade: AP Calculus AB
- Chapter: Implicit Differentiation
- Standards: AP CALC AB 3.2
- Time: 45 minutes
- Total: 20 points

Question 1 - Implicit derivative [3 pts]

Find $\frac{dy}{dx}$ for $x^3 + 3xy + y^2 = 11$.

Question 2 - Slope on an ellipse [2 pts]



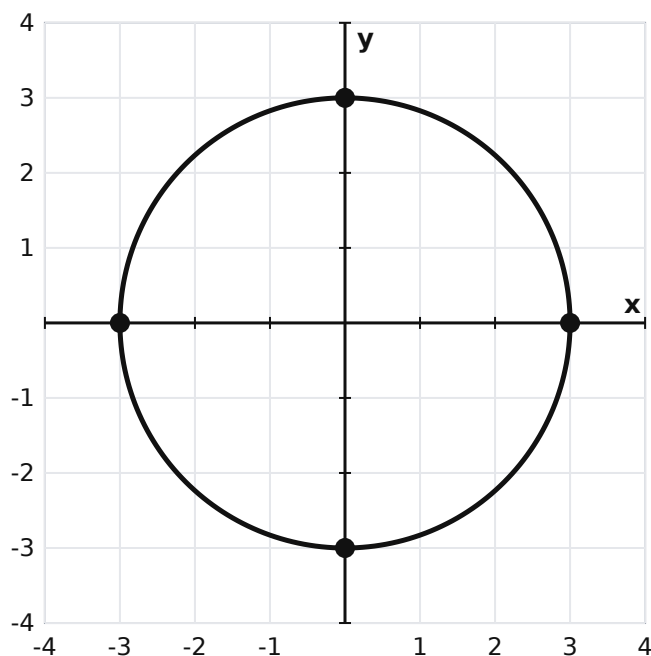
The ellipse $x^2 + 4y^2 = 16$.

The point $(2, \sqrt{3})$ lies on $x^2 + 4y^2 = 16$. Find the slope of the tangent there and write its equation.

Question 3 - Chain rule in y [2 pts]

Find $\frac{dy}{dx}$ for $\cos y = x^2 y$.

Question 4 - Horizontal and vertical tangents [3 pts]



The circle $x^2 + y^2 = 9$.

For the circle $x^2 + y^2 = 9$, find $\frac{dy}{dx}$ and the points where the tangent is horizontal or vertical.

Question 5 - Tangent line [3 pts]

Find the tangent line to $x^2 + xy = 2$ at $(1,1)$.

Question 6 - Second derivative [2 pts]

For $x^2 + y^2 = 25$, show that $\frac{d^2y}{dx^2} = -\frac{25}{y^3}$.

Question 7 - Implicit slope with a product [2 pts]



Part of the curve $x^2 + xy = 2$.

The curve $x^2 + xy = 2$ passes through (1,1). Find $\frac{dy}{dx}$ at that point.

Question 8 - Ferris wheel [3 pts]

A seat on a Ferris wheel moves on the circle $x^2 + y^2 = 64$ (feet, origin at the center). (a) Find $\frac{dy}{dx}$. (1 point) (b) Find the slope of the path at the point $(4\sqrt{3}, 4)$. (1 point) (c) What is the slope at the top, (0,8)? (1 point)