

Problem 1.

Find $\frac{dy}{dx}$ for each of the following. Make sure to show all your work in a clear and concise manner.

A. $y = \sqrt{x^3 + 1}$

Simplified Answer:

B. $y = \frac{x^2 + x - 1}{x^2 - 1}$

Simplified Answer:

C. $y = -x \tan x$

Simplified Answer:

D. $y = (x + 1)^x$

Simplified Answer:

Problem 2.

Find the following antiderivatives. Make sure to show all your work in a clear and concise manner.

A. $\frac{2}{3} \int x^{(-\frac{1}{3})} dx$

Simplified Answer:

B. $\int \frac{\cos(x)}{\sqrt{\sin(x)}} dx$

Simplified Answer:

C. $\int \sqrt{\cot(x)} \csc(x)^2 dx$

Simplified Answer:

D. $\int x \sqrt{2x+1} dx$

Simplified Answer:

Problem 3.

Use implicit differentiation and the equation $x^2 + 3xy + y^3 = 10$ to find $\frac{dy}{dx}$. Make sure to show all your work in a clear and concise manner.

Problem 4.

A particle **P** is moving along the graph of $y = \sqrt{x^2 - 4}$, $2 \leq x$, such that the x-coordinate is increasing at the rate of 5 units per second, i.e. $x'(t) = 5$. How fast is the y-coordinate of **P** increasing when $x = 3$?

Problem 5.

Find the dimensions of the rectangle of maximum area, with sides parallel to the coordinate axes, that can be inscribed in the ellipse given by $\frac{x^2}{144} + \frac{y^2}{16} = 1$.