AP Calc AB Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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 WS Assessment

 Target 8:

Derivative: implicit and inverse

**I can:**

* Calculate derivatives of implicit defined functions
* Calculate derivatives of inverse functions

Unit 3: Differentiation: Composite, Implicit, and Inverse Functions

HW Target 8

Unit 3 Progress Check MCQ



g(f(1)) f(f(4) f ' (g(1)) g ' [(f(4))2]

g ' [(f(4))] 2 [f(g(4)) ' [f(4)g(4)] ' [f(4)/g(4)] '

[g(f(3))] ' [f(g(3))] ' [f(3)g(3)] ' [f(3)/g(3)] '



Implicit differentiation.

 When it is difficult to solve an equation in terms of y (e.g x2 – 2y3 + 4y = 2) use the following steps to solve it implicitly

 Step 1: Differentiate both sides of the equation with respect to x

 Step 2: Solve the equation for dy/dx

Find dy/dx for the followings

 2y = x2 + sin y x2 – xy + y2 = 7 2x3 – 3y2 = 8

Find the slope of the circle x2 + y2 = 25 at the point (3, 4). Sketch

Find the tangent and normal to the ellipse x2 - xy + y2 = 7 at the point (1, 3). Sketch

A curve in the xy-plane is defined by xy2 – x3y = 6.

a. Find dy/dx

b. Find an equation for the tangent line at each point on the curve with x-coordinate 1

c. Find the x-coordinate of each point on the curve when the tangent line is vertical

d. Sketch the function and its derivative

Derivative of Inverse Function $\frac{d}{dx}f^{-1}(x)=\frac{1}{f^{'}(f^{-1}(x))}$

Given f(x) = ½ x – 1. Find [f-1(x)] ' without and with formula

|  |  |
| --- | --- |
| Without formulaf-1(x) = | With formulaf ’(x) = $\frac{1}{f^{'}(f^{-1}(x))}$ |

Let f(x) = 2x5 + x3 + 1. Find $\frac{d}{dx}f^{-1}(x)$ at x = 4

Step 1: Solve 2x5 + x3 + 1 = 4 🡪 x = 1. We say f(1) = 4 🡪 f -1(4) = 1

Step 2: Find f ' (x) = 10x4 + 3x2

Step 3: Use formula $\frac{d}{dx}f^{-1}\left(4\right)=\frac{1}{f^{'}\left(f^{-1}\left(4\right)\right)}=\frac{1}{10\left(1^{4}\right)+3(1^{4})}=\frac{1}{13}$

If   f(x) = x3 + 7x + 2, and   f(1) = 10, calculate the value $\frac{d}{dx}f^{-1}(10)$

If   f(x) = 7x3 + (ln x)3, and   f(1) = 7, calculate the value of  $\frac{d}{dx}f^{-1}(7)$

Find the equation of the line tangent to the inverse of f(x) = x5 + 2x3 + x – 4 at point   (-4, 0).

Take a look at the table below, showing values of a function  f(x) and its derivative, f '(x)

 Use the table to find   (f-1)'(1)   and   (f-1)'(-3).

Given a function g(x) such that

g(4) = 6 and g′(4) = −2. Find $\frac{d}{dx}g^{-1}(6)$

Assessment

Find the two points where the curve x2 + xy + y2 = 7 crosses the x-axis, and show that the tangents to the curve at these points are parallel. Where the tangent of this curve is parallel to the y-axis?

Let f(x) = x5 – x3 + 2x. Find $\frac{d}{dx}f^{-1}(x)$ at x = 2