Math 1431

Section 16679

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Questions

Examples: Suppose

$$f(2) = 7, \;\; f'(2) = 1, \;\; f(5) = 4, \;\; f'(5) = 3$$
$$g(2) = 5, \;\; g'(2) = 3, \;\; g(5) = 10, \;\; g'(5) = 6$$

1. If $h(x) = (fg)(x)$, find $h'(2)$.

2. If $h(x) = \left(\frac{f}{g}\right)(x)$, find $h'(2)$.

Suppose

$$f(2) = 7, \quad f'(2) = 1, \quad f(5) = 4, \quad f'(5) = 3$$
$$g(2) = 5, \quad g'(2) = 3, \quad g(5) = 10, \quad g'(5) = 6$$

3. If $h(x) = [f(x)]^3$, find $h'(2)$.

4. If $h(x) = (f \circ g)(x)$, find $h'(2)$.

Quiz 8 Questions

3) Find $\dfrac{d^2}{dx^2}[(3x^2+2x)\cos(x)]$

Quiz 8 Questions

5) $\dfrac{d}{dx}\left(5x \cdot \dfrac{d}{dx}(x - 6x^2)\right) =$

Quiz 8 Questions

6) Find $\dfrac{dy}{dx}$ at $x = 0$ given $y = \dfrac{1}{2 + u^2}$ and $u = 3x + 4$.

Quiz 8 Questions

8) Express the derivative $\frac{d}{dx}\left(f(3x^3+7)\right)$ in terms of f'.

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1. If $f(x) = g(x) \cdot h(x)$, $f'(x) =$.

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2. If $f(x) = \dfrac{g(x)}{h(x)}$, $f'(x) =$.

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3. If $f(x) = g(h(x))$, $f'(x) =$.

What is the derivative of y with respect to x?

What are the steps for finding $\dfrac{dy}{dx}$ using implicit differentiation?

Examples: Find $\frac{dy}{dx}$.

3. $2x^3 + y^2 = 8$

Examples: Find $\dfrac{dy}{dx}$.

4. $y^3 + 2y^2 - 3y + x = 2$

Examples: Find the derivative.

1. $\dfrac{d}{dx}\left(x^3y\right)$

2. $\dfrac{d}{dx}\left(\sin(y^2)\right)$

3. $\dfrac{d}{dx}\left(\sin^2(y)\right)$

4. $\dfrac{d^2}{dx^2}\left(2x^3y\right)$

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4. $\dfrac{d}{dx}(xy) =$

Quiz 9 Questions

9) Find $\dfrac{d^2y}{dx^2}$ in terms of x and y given $-3x^2 + xy = 11$.

Quiz 9 Questions

10) Find $\dfrac{d^2y}{dx^2}$ at the point (1,3) given $x^2 + y^2 = 10$.

Quiz 9 Questions

12) Find $\frac{dy}{dx}$ given $\frac{3x}{\sqrt{x^2+4}}$

In this section we will use implicit differentiation on problems that involve rates of change with respect to time. Any variable that changes over time will be considered a function of time (t). We will be taking derivatives with respect to time $\left(\dfrac{d}{dt}\right)$.

Section 3.1 - Related Rates

First, let's review some geometry formulas:

- Pythagorean Thm: $a^2 + b^2 = c^2$
- Area of a circle: $A = \pi r^2$
- Area of a triangle: $A = \dfrac{1}{2}bh$
- Volume of a cone: $V = \dfrac{1}{3}\pi r^2 h$
- Volume of a sphere: $V = \dfrac{4}{3}\pi r^3$

How to solve a related rates word problem:

- Draw a picture.
- Determine what you know and what you need to find.
- Write an equation involving the variables whose rates of change either are given or are to be determined. (This is an equation that relates the parts of the problem.)
- Implicitly differentiate both sides of the equation with respect to time. This FREEZES the problem.
- Solve for what you need.

Examples:

1. Assume that oil spilled from a ruptured tanker spreads in a circular pattern whose radius increases at a constant rate of 2 ft/sec. How fast is the area of the spill increasing when the radius of the spill is 60 feet?

2. A 5 foot ladder, leaning against a wall, slips so that its base moves away from the wall at a rate of 2 ft/sec. How fast will the top of the ladder be moving down the wall when the base is 4 feet from the wall?

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5. $\dfrac{d}{dx}\left(\cos(x^2)\right) =$