

Calculus: Test 3 Note Card

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Chain Rule

$$\frac{d}{dx} \text{whole} \cdot \frac{d}{dx} \text{inside}$$

Works with product and quotient rules

Works with trig functions

$$\frac{d}{dx} \sin x^2 \quad \text{where whole} = \sin x^2 \text{ and inside} = x^2$$

Works with e

$$\frac{d}{dx} e^u = e^u * \ln e * \frac{d}{dx} u$$

Trigonometric Differentiation

$$\frac{d}{dx} \sin x = \cos x$$

$$\frac{d}{dx} \cos x = -\sin x$$

$$\frac{d}{dx} \tan x = \sec^2 x$$

$$\frac{d}{dx} \csc x = -\csc x \cot x$$

$$\frac{d}{dx} \sec x = \sec x \tan x$$

$$\frac{d}{dx} \cot x = -\csc^2 x$$

Logarithmic Differentiation

$$\frac{d}{dx} \log_a u = \frac{du}{u \cdot \ln a}$$

$$\frac{d}{dx} \ln u = \frac{du}{u}$$

Arc Differentiation

$$\frac{d}{dx} \sin^{-1} x = \frac{du}{\sqrt{1-u}}$$

$$\frac{d}{dx} \tan^{-1} x = \frac{du}{1+u}$$

Differentiation Laws

$$\frac{d}{dx} x^n = nx^{n-1}$$

$$\frac{d}{dx} c = 0$$

$$\frac{d}{dx} cx^n = c * nx^{n-1}$$

$$\frac{d}{dx} e^u = e^u * \ln e * \frac{d}{dx} u$$

$$\frac{a}{x^2} = ax^{-2} \text{ (for speedier differentiation)}$$

Product Rule

$$f * s' + s * f'$$

Quotient Rule

$$\frac{b * t' - t * b'}{b^2}$$

(squared, not second derivative)

Differential Usage

1st dx

- Velocity
- Rate of _____
- Rate of Change of _____
- Instantaneous Rate of Change
- Current
- Linear Density
- Marginal Cost
- Sensitivity
- Slope

2nd dx

Acceleration

3rd dx

Jerk

Average Velocity/Average Rate of Change

- Use slope formula
 - $\frac{y_2 - y_1}{x_2 - x_1}$
- x-values are given
- Plug x-values into given equation to find corresponding y-values

Instructions and Notes

1. Use this note card to take the test
2. Draw a picture of Julie in Hawaii on the back or over to the right.
3. Staple this to your note card
4. Pass this test.