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3.3 Rules for Differentiation Chapter 3 day 6

Rule 1: *The derivative of a constant is _____.*

If $f(x) = k$, then $f'(x) =$ ____

Example:

Rule 2: *Power Rule*

If $f(x) = mx$, then $f'(x) = slope =$ ____

Find a formula for the derivative of

a) $f(x) = x^2$.

b) $f(x) = x^3$.

c) Find a formula for the derivative of $(x) = x^7$.

If $f(x) = x^n$, then $f'(x) =$ ____

Rule 3: *Constant Multiple Rule*

If *f* is differentiable and *c* is a constant then: $\frac{d}{dx}\left[c \cdot f(x)\right] = c \cdot f'(x)$

If *u* is differentiable function of *x* and *c* is a constant then: $\frac{d}{dx}\left(c \cdot u\right) = c \cdot \frac{du}{dx}$

Why?

Example:

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Rule 4: *Sum and Difference Rule*

If g and f are differentiable then: $\frac{d}{dx}\left[f(x) \pm g(x)\right] =$

If *u* and *v* are differentiable functions of *x* then: $\frac{d}{dx}\left(u \pm v\right) =$

Why?

Example:

Finding Horizontal Tangents

Example: Does the curve $y = x^4 - 2x^2 + 2$ have any horizontal tangents?
Solve analytically and confirm graphically.

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Example: Find the derivative of $y = 0.2x^4 - 0.7x^3 - 2x^2 + 5x + 4$. Graph the derivative and find its zeros. What do the zeros represent?

Second Derivative:

HOMEWORK: pg 119: 8, 9, 10 pg 120: 1 – 10