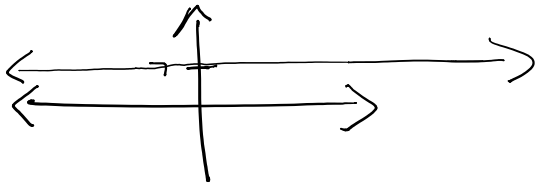
# Derivative Rules

Monday, September 18, 2017 8:55 AM

A.) $y = 7$



$m = 0$

$\therefore$ slope of tangent everywhere $= 0$.

$\therefore$ $y' = \frac{dy}{dx} = f'(x) = 0$

all notations for derivative.

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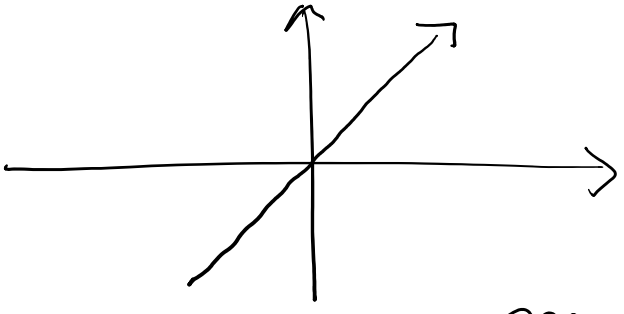
B. $f(x) = x$



$m = 1$.

$\therefore$ $f'(x) = 1$.

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C. $f(x) = -3x$

## Constant Multiple Rule.

$$f(x) = -3x$$

$$= -3[x]$$

$$f'(x) = -3 \cdot \frac{dy}{dx}[x]$$

$$= -3(1)$$

$$= -3$$

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## Power Rule:

$f(x) = x^2 \Rightarrow f'(x) = 2x$

$g(x) = x^{11} \Rightarrow g'(x) = 11x^{10}$

$h(x) = x^m \Rightarrow h'(x) = m \cdot x^{m-1}$

ex: $f: x^1 \Longrightarrow f'(x) = 1 \cdot x^{1-1}$

$= 1 \cdot x^0$

$= 1 \cdot 1$

$= 1$

Chain Rule:

Later:

Think composition

$f(x): (2x^7+6x^5)^{10}$

$f'(x) = \underbrace{10(2x^7+6x^5)^9}_{\text{power}} \cdot \underbrace{\frac{dy}{dx}(2x^7+6x^5)}_{\text{finish}}$

Add/subtration.

$$\frac{dy}{dx}\left[f(x) + g(x)\right] = f'(x) + g'(x)$$

This only works for $+$ $-$.

Not Not Not for $\cdot$ or $\div$

# Polynomial Rule:

$$f(x) = 3x^7 - 4x^6 + 3x^2 - 10$$

$$f'(x) = \frac{dy}{dx}(3x^7) - \frac{dy}{dx}(4x^6) + \frac{dy}{dx}(3x^2) - \frac{dy}{dx}(10)$$

$$= 3 \cdot \frac{dy}{dx}(x^7) - 4\,\frac{dy}{dx}(x^6) + 3\,\frac{dy}{dx}(x^2) - 0$$

$$= 3 \cdot 7x^6 - 4 \cdot 6x^5 + 3 \cdot 2x$$

$$= \boxed{21x^6 - 24x^5 + 6x}$$

$f(x) = \sin x$

$f'(x) = \cos x$

$g(x) = \cos x$

$g'(x) = -\sin x$

$f(x) = \frac{1}{x^6} \Rightarrow f'(x)$

$= x^{-6} \Rightarrow$

* be careful!

$x^{-1}$

Recall!

$$\sqrt{x} = x^{1/2}$$

2.2 : 3-63 (3N)

89-99 odds

$-4+1 = -3$

$-4-1 = -5$