TOPIC: HIGHER ORDER DERIVATIVES
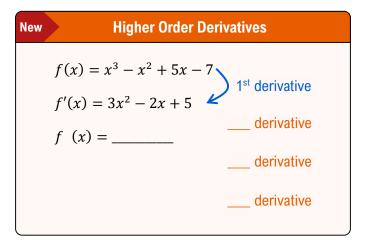
Higher Order Derivatives

◆ Higher order derivatives are just _____ differentiation.

▸ For example, to find the *second* derivative of a function, take the derivative *twice*!

EXAMPLE Find the fourth derivative of the function.

New	Higher Order Derivatives

$$f(x) = x^3 - x^2 + 5x - 7$$

1st derivative

$$f'(x) = 3x^2 - 2x + 5$$

____ derivative

$$f\ (x) = \underline{\hspace{2cm}}$$

____ derivative

____ derivative

◆ Notations for higher order (n^{th}) derivatives: $f^{(n)}(x)$, $D_x^n f(x)$, $\dfrac{d^n f}{dx^n}$, $\dfrac{d^n y}{dx^n}$

EXAMPLE Find $f''(x)$.

$$f(x) = 4x^{-3} + 3x^7$$

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For $f(x)$, find $f^{(5)}(x)$.

$f(x) = x^8$

Find the third derivative of the given function.

(A)

$f(x) = 24 + 4x^5$

(B)

$y = 3x^2 + 9x + 1$

(C)

$f(t) = 5t^{-4}$