

## 1.1: 5.6 Derivatives of Polynomials

### Definition: Derivative of Polynomials

Given the function  $f(x) = 6x^2 + 3x + 6$ , find the derivative. When the function is a polynomial, you can find the derivative by doing the following for each term.

$$f'(x) = 2(6)x^{2-1} + (1)(3)x^0 + (0)6x^{0-1} = 12x^1 + 3x^0 + 0 = 12x + 3$$

- 1) Bring the exponent down and multiply it by the coefficient.
- 2) Subtract one from the exponent.
- 3) Simplify.
- 4) The derivative of a constant is 0.

### ✓ Example 1.1.5.6.1

Find the derivative of the following polynomial.

$$f(x) = 4x^3 - 5x^2 + 10x - 5$$

Solution

$$f'(x) = 3(4)x^{3-1} - (2)(5)x^{2-1} + (1)(10)x^{1-1} - 0$$

$$f'(x) = 12x^2 - 10x^1 + 10x^0 - 0$$

$$f'(x) = 12x^2 - 10x + 10$$

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