

**Lesson 6.4: The Second Fundamental Theorem of Calculus**Warm-Up

1.  $\int_0^x (2t - 3) dt =$

3.  $\frac{d}{dx} \int_0^x (2t - 3) dt =$

2.  $\int_{10}^x f'(t) dt =$

4.  $\frac{d}{dx} \int_{10}^x f'(t) dt =$

The Second Fundamental Theorem of CalculusExamples:

1.  $\int_0^{x^2} f'(t) dt =$

3.  $\frac{d}{dx} \int_0^{x^2} f'(t) dt =$

2.  $\int_{x^3}^{2x} f'(t) dt =$

4.  $\frac{d}{dx} \int_{x^3}^{2x} f'(t) dt =$

The Second Fundamental Theorem (Chain Rule Version)

Examples: Find each of the following **without integrating**.

$$1. \frac{d}{dx} \int_x^0 (2t - 3) dt =$$

$$2. \frac{d}{dx} \int_{-1}^{x^3} (t^2 + 2t) dt =$$

$$3. \frac{d}{dx} \int_{f(x)}^{g(x)} (2t - 3) dt =$$

$$4. \frac{d}{dx} \int_2^5 (2t - 3) dt =$$

$$5. \frac{d}{dx} \int_{2x}^{3x} (t^2 + 2t) dt =$$

$$6. \text{ If } f(x) = \int_0^{3x^2} (1 - t^2)^{10} dt, \text{ then } f'(x) =$$