

Mathematics 126

Fourth 5.4

Find the derivatives of the following functions of x .

1. $\frac{d}{dx} \int_3^{2x} \cos(5t) dt = \cos(10x) \cdot 2$

2. $\frac{d}{dx} \int_{\sin(x)}^{x^2} 3r dr = 3x^2 \cdot 2x - 3 \sin(x) \cos(x)$

3. $\frac{d}{dx} \int_{-3}^{\tan(x)} \sin(t^3) dt = \sin(\tan^3(x)) \sec^2(x)$

4. Find $F'(2)$ for $F(x) = \int_4^{2x-7} \frac{t-3}{t^2+2} dt$

$$F'(x) = \frac{2x-7-3}{(2x-7)^2+2} \cdot 2$$

$$F'(2) = \frac{4-10}{(-3)^2+2} \cdot 2 = \frac{-6}{11} \cdot 2 = \frac{-12}{11}$$

5. $\frac{d}{dx} \int_{2x}^{\sin(x)} (16r^2 + 1) dr$

$$= (16 \sin^2(x) + 1) \cos(x) - (16(2x)^2 + 1) \cdot 2$$

6. Find a function F with derivative $x \sin(x)$ and $F'(12) = 88$.

$$F'(x) = x \sin(x)$$

So $F'(12) = 12 \sin(12) \neq 88$

So no such function F can exist.