

1. Use the first part of the Fundamental Theorem of Calculus to find the derivatives of the following functions.

(a) $g(x) = \int_1^x \sin(3t^2) dt$

(b) $h(x) = \int_x^0 (u^2 - u)^3 du$

(c) $R(x) = \int_1^{x^2} \sqrt{3 + t^2} dt$

2. Evaluate the following integrals.

(a) $\int_{-6}^3 \pi dt$

(b) $\int_{\frac{-\pi}{4}}^{\frac{\pi}{2}} \sin \theta d\theta$

(c) $\int_{-1}^4 |2x - 3| dx$

(d) $\int u^2 + \frac{u}{4} - 16 du$

(e) $\int 2 + \sec^2(\theta) d\theta$

$$(f) \int \sqrt{x^7} - \frac{1}{\sqrt{x}} dx$$

$$(g) \int 4x\sqrt{1-x^2} dx$$

$$(h) \int \sec(5\omega) \tan(5\omega) d\omega$$

$$(i) \int_{-1}^0 (3t-1)^{20} dt$$

$$(j) \int x(2x+5)^8 dx$$

3. The velocity function in m/s is $v(t) = 3 - 4t + t^2$. Find the displacement and distance traveled by the particle during the interval $0 \leq t \leq 4$.