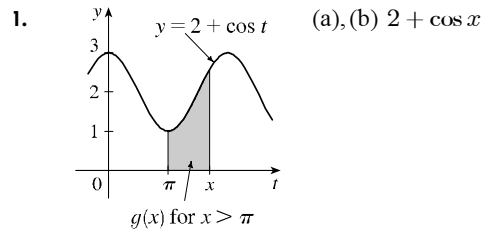




# Answers

**E** [Click here for exercises.](#)

**S** [Click here for solutions.](#)



2.  $g'(x) = (x^2 - 1)^{20}$

3.  $g'(x) = \sqrt{x^3 + 1}$

4.  $g'(u) = \frac{1}{1 + u^4}$

5.  $g'(t) = \sin(t^2)$

6.  $F'(x) = -(2 + \sqrt{x})^8$

7.  $h'(x) = \frac{-\sin^4(1/x)}{x^2}$

8.  $h'(x) = \frac{\sqrt{x}}{2(x+1)}$

9.  $\frac{dy}{dx} = -\sin(\tan^4 x) \sec^2 x$

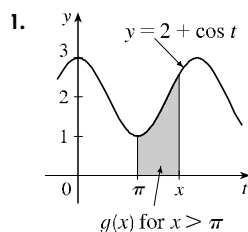
10.  $\frac{dy}{dx} = -\frac{2 \sin(x^2)}{x}$

11.  $\frac{dy}{dx} = \frac{5}{25x^2 + 10x - 4}$

12.  $\frac{dy}{dx} = \sin x \cos x \cos(\sin^3 x)$

## Solutions

**E** [Click here for exercises.](#)



$$(a) g(x) = \int_{\pi}^x (2 + \cos t) dt \Rightarrow g'(x) = 2 + \cos x$$

$$(b) g(x) = \int_{\pi}^x (2 + \cos t) dt = [2t + \sin t]_{\pi}^x \\ = (2x + \sin x) - (2\pi + 0) = 2x + \sin x - 2\pi \\ \text{so } g'(x) = 2 + \cos x.$$

$$2. g(x) = \int_1^x (t^2 - 1)^{20} dt \Rightarrow g'(x) = (x^2 - 1)^{20}$$

$$3. g(x) = \int_{-1}^x \sqrt{t^3 + 1} dt \Rightarrow g'(x) = \sqrt{x^3 + 1}$$

$$4. g(u) = \int_{\pi}^u \frac{1}{1+t^4} dt \Rightarrow g'(u) = \frac{1}{1+u^4}$$

$$5. g(t) = \int_0^t \sin(x^2) dx \Rightarrow g'(t) = \sin(t^2)$$

$$6. F(x) = \int_x^4 (2 + \sqrt{u})^8 du = -\int_4^x (2 + \sqrt{u})^8 du \Rightarrow \\ F'(x) = -(2 + \sqrt{x})^8$$

$$7. \text{ Let } u = \frac{1}{x}. \text{ Then } \frac{du}{dx} = -\frac{1}{x^2}, \text{ so}$$

$$\frac{d}{dx} \int_2^{1/x} \sin^4 t dt = \frac{d}{du} \int_2^u \sin^4 t dt \cdot \frac{du}{dx} \\ = \sin^4 u \frac{du}{dx} = \frac{-\sin^4(1/x)}{x^2}$$

$$8. \text{ Let } u = \sqrt{x}. \text{ Then } \frac{du}{dx} = \frac{1}{2\sqrt{x}}, \text{ so}$$

$$h'(x) = \frac{d}{dx} \int_1^{\sqrt{x}} \frac{s^2}{s^2 + 1} ds \\ = \frac{d}{du} \int_1^u \frac{s^2}{s^2 + 1} ds \cdot \frac{du}{dx} = \frac{u^2}{u^2 + 1} \frac{du}{dx} \\ = \frac{x}{x+1} \frac{1}{2\sqrt{x}} = \frac{\sqrt{x}}{2(x+1)}$$

$$9. \text{ Let } u = \tan x. \text{ Then } \frac{du}{dx} = \sec^2 x, \text{ so}$$

$$\frac{d}{dx} \int_{\tan x}^{17} \sin(t^4) dt = -\frac{d}{dx} \int_{17}^{\tan x} \sin(t^4) dt \\ = -\frac{d}{du} \int_{17}^u \sin(t^4) dt \cdot \frac{du}{dx} \\ = -\sin(u^4) \frac{du}{dx} \\ = -\sin(\tan^4 x) \sec^2 x$$

**A** [Click here for answers.](#)

$$10. \text{ Let } u = x^2. \text{ Then } \frac{du}{dx} = 2x, \text{ so}$$

$$\frac{dy}{dx} = \frac{d}{dx} \int_{x^2}^{\pi} \frac{\sin t}{t} dt = -\frac{d}{dx} \int_{\pi}^{x^2} \frac{\sin t}{t} dt \\ = -\frac{d}{du} \int_{\pi}^u \frac{\sin t}{t} dt \cdot \frac{du}{dx} = -\frac{\sin u}{u} \cdot \frac{du}{dx} \\ = -\frac{\sin(x^2)}{x^2} \cdot 2x = -\frac{2\sin(x^2)}{x}$$

$$11. \text{ Let } t = 5x + 1. \text{ Then } \frac{dt}{dx} = 5, \text{ so}$$

$$\frac{d}{dx} \int_0^{5x+1} \frac{1}{u^2 - 5} du = \frac{d}{dt} \int_0^t \frac{1}{u^2 - 5} du \cdot \frac{dt}{dx} \\ = \frac{1}{t^2 - 5} \frac{dt}{dx} \\ = \frac{5}{25x^2 + 10x - 4}$$

$$12. \text{ Let } u = \sin x. \text{ Then } \frac{du}{dx} = \cos x, \text{ so}$$

$$\frac{dy}{dx} = \frac{dy}{du} \frac{du}{dx} = \frac{d}{du} \int_{-5}^u t \cos(t^3) dt \cdot \frac{du}{dx} \\ = u \cos(u^3) \frac{du}{dx} = \sin x \cos(\sin^3 x) \cos x \\ = \sin x \cos x \cos(\sin^3 x)$$