

Differentiate each function with respect to  $x$ .

1)  $y = \cos^{-1} -5x^3$

$$\begin{aligned}\frac{dy}{dx} &= -\frac{1}{\sqrt{1 - (-5x^3)^2}} \cdot -15x^2 \\ &= \frac{15x^2}{\sqrt{1 - 25x^6}}\end{aligned}$$

2)  $y = \sin^{-1} -2x^2$

$$\begin{aligned}\frac{dy}{dx} &= \frac{1}{\sqrt{1 - (-2x^2)^2}} \cdot -4x \\ &= -\frac{4x}{\sqrt{1 - 4x^4}}\end{aligned}$$

3)  $y = \tan^{-1} 2x^4$

$$\begin{aligned}\frac{dy}{dx} &= \frac{1}{(2x^4)^2 + 1} \cdot 8x^3 \\ &= \frac{8x^3}{4x^8 + 1}\end{aligned}$$

4)  $y = \csc^{-1} 4x^2$

$$\begin{aligned}\frac{dy}{dx} &= -\frac{1}{|4x^2| \sqrt{(4x^2)^2 - 1}} \cdot 8x \\ &= -\frac{2}{x\sqrt{16x^4 - 1}}\end{aligned}$$

5)  $y = (\sin^{-1} 5x^2)^3$

$$\begin{aligned}\frac{dy}{dx} &= 3 \cdot (\sin^{-1} 5x^2)^2 \cdot \frac{1}{\sqrt{1 - (5x^2)^2}} \cdot 10x \\ &= \frac{30x \cdot (\sin^{-1} 5x^2)^2}{\sqrt{1 - 25x^4}}\end{aligned}$$

6)  $y = \sin^{-1} (3x^5 + 1)^3$

$$\begin{aligned}\frac{dy}{dx} &= \frac{1}{\sqrt{1 - ((3x^5 + 1)^3)^2}} \cdot 3(3x^5 + 1)^2 \cdot 15x^4 \\ &= \frac{45x^4(3x^5 + 1)^2}{\sqrt{1 - (3x^5 + 1)^6}}\end{aligned}$$

7)  $y = (\cos^{-1} 4x^2)^2$

$$\begin{aligned}\frac{dy}{dx} &= 2\cos^{-1} 4x^2 \cdot -\frac{1}{\sqrt{1 - (4x^2)^2}} \cdot 8x \\ &= -\frac{16x\cos^{-1} 4x^2}{\sqrt{1 - 16x^4}}\end{aligned}$$

8)  $y = \cos^{-1} (-2x^3 - 3)^3$

$$\begin{aligned}\frac{dy}{dx} &= -\frac{1}{\sqrt{1 - ((-2x^3 - 3)^3)^2}} \cdot 3(-2x^3 - 3)^2 \cdot -6x^2 \\ &= \frac{18x^2(-2x^3 - 3)^2}{\sqrt{1 - (-2x^3 - 3)^6}}\end{aligned}$$

Evaluate each indefinite integral.

$$1) \int \frac{1}{\sqrt{16-x^2}} dx$$
$$\sin^{-1} \frac{x}{4} + C$$

$$2) \int \frac{1}{4+x^2} dx$$
$$\frac{1}{2} \cdot \tan^{-1} \frac{x}{2} + C$$

$$3) \int \frac{1}{x\sqrt{x^2-1}} dx$$
$$\sec^{-1} |x| + C$$

$$4) \int \frac{1}{16+x^2} dx$$
$$\frac{1}{4} \cdot \tan^{-1} \frac{x}{4} + C$$

$$5) \int \frac{1}{x\sqrt{x^2-4}} dx$$
$$\frac{1}{2} \cdot \sec^{-1} \frac{|x|}{2} + C$$

$$6) \int \frac{1}{\sqrt{25-x^2}} dx$$
$$\sin^{-1} \frac{x}{5} + C$$

$$7) \int \frac{1}{x\sqrt{x^2-81}} dx$$
$$\frac{1}{9} \cdot \sec^{-1} \frac{|x|}{9} + C$$

$$8) \int \frac{1}{4+x^2} dx$$
$$\frac{1}{2} \cdot \tan^{-1} \frac{x}{2} + C$$

Evaluate each indefinite integral. Use the provided substitution.

$$1) \int \frac{20x^3}{\sqrt{25 - 25x^8}} dx; u = 5x^4$$
$$\sin^{-1} \frac{5x^4}{5} + C$$

$$2) \int \frac{10x^4}{9 + 4x^{10}} dx; u = 2x^5$$
$$\frac{1}{3} \cdot \tan^{-1} \frac{2x^5}{3} + C$$

$$3) \int -\frac{2 \cdot \csc^2 2x}{\cot(2x) \cdot \sqrt{\cot^2 2x - 1}} dx; u = \cot 2x$$
$$\sec^{-1} |\cot 2x| + C$$

$$4) \int \frac{1}{x\sqrt{25 - (\ln -2x)^2}} dx; u = \ln -2x$$
$$\sin^{-1} \frac{\ln -2x}{5} + C$$

Evaluate each indefinite integral.

$$5) \int \frac{8x}{\sqrt{9 - 16x^4}} dx$$
$$\sin^{-1} \frac{4x^2}{3} + C$$

$$6) \int \frac{3x^2}{x^3\sqrt{x^6 - 1}} dx$$
$$\sec^{-1} |x^3| + C$$

$$7) \int \frac{10x}{16 + 25x^4} dx$$
$$\frac{1}{4} \cdot \tan^{-1} \frac{5x^2}{4} + C$$

$$8) \int -\frac{4\sin 4x}{\sqrt{9 - \cos^2 4x}} dx$$
$$\sin^{-1} \frac{\cos 4x}{3} + C$$