5.2 Integrals of Trig Functions
5.9 Integration and Completing the Square of Inverse Trig Functions

Evaluate $\int 5 \sec x \tan x \, dx$.

a) $5 \sec^3 x \tan x + C$
(b) $5 \sec x + C$
c) $\frac{1}{5} \sec^3 x \tan x + C$
(d) $5[\sec^3 x + \sec x \tan^2 x] + C$
e) None of these

Evaluate $\int \frac{\sin^3 \theta}{1 - \cos^2 \theta} \, d\theta$.

(a) $-\cos \theta + C$
(b) $\cos \theta + C$
(c) $\frac{\cos \theta [3 - 3\cos^2 \theta - 2\sin^2 \theta]}{1 - \cos^2 \theta}$
(d) $\frac{1}{2} \sin^2 \theta + C$
(e) None of these

Evaluate $\int 3 \csc^2 x \, dx$.

(a) $\frac{1}{3} \csc^3 x + C$
(b) $6 \csc^2 x \cot x + C$
(c) $-3 \cot x + C$
(d) $-\frac{1}{3} \csc^3 x + C$
(e) None of these

Evaluate $\int \frac{\sec^3 \theta \tan \theta}{1 + \tan^2 \theta} \, d\theta$.

(a) $\frac{1}{4} \sec^4 \theta + C$
(b) $\frac{1}{2} \sec^2 \theta + C$
(c) $\frac{1}{4} \sec^2 \theta \tan^2 \theta + C$
(d) $\sec \theta + C$
(e) None of these

Evaluate $\int 3 \csc x \cot x \, dx$.

Evaluate $\int \frac{\cos^3 \theta}{2 - 2\sin^2 \theta} \, d\theta$.

Evaluate $\int_{\pi/4}^{\pi/3} \sec^2 x \, dx$.

Find the average value of $f(x) = \sin x$ on the interval $\left[\frac{\pi}{4}, \frac{\pi}{2}\right]$.

9. Evaluate $\int \cos 3x \, dx$.

(a) $\sin 3x + C$ (b) $-\sin 3x + C$ (c) $-\sin \frac{3}{2} x^2 + C$

(d) $\frac{1}{3} \sin 3x + C$ (e) None of these

10. Evaluate $\int \sin^3 3x \cos 3x \, dx$.

(a) $\frac{1}{8} \sin^4 3x \cos^2 3x + C$ (b) $\frac{1}{4} \sin^4 3x + C$

(c) $3 \sin^2 3x(3 \cos^2 3x - \sin^2 3x) + C$ (d) $\frac{1}{12} \sin^4 3x + C$

(e) None of these

11. Evaluate $\int \sin \frac{x}{2} \, dx$.

(a) $\cos \frac{x}{2} + C$ (b) $-2 \cos \frac{x}{2} + C$ (c) $\sin \frac{x^2}{4} + C$

(d) $2 \sin^2 \frac{x}{2} + C$ (e) None of these

12. Evaluate $\int \frac{\sec^2 x}{\sqrt{\tan x}} \, dx$.

13. Evaluate $\int \tan 3x \, dx$.

(a) $\frac{1}{3} \ln |\sec 3x| + C$ (b) $3 \sec^2 3x + C$ (c) $\frac{1}{3} \sec^2 3x$

(d) $\ln |\cos 3x| + C$ (e) None of these

14. Evaluate $\int \frac{\sin^2 x - \cos^2 x}{\sin x} \, dx$.

(a) $-2 \cos x + \ln |\csc x + \cot x| + C$ (b) $-\ln |\csc x + \cot x| + C$

(c) $-\sec x + C$ (d) $\cos x + \ln |\csc x + \cot x| + C$

(e) None of these

15. Evaluate $\int x \cot x^2 dx$.

(a) $\frac{x^2}{2} \sec^2 x^2 + C$ (b) $\frac{x^2}{4} \ln |\sin x^2| + C$ (c) $x \cot x^2 \csc x^2 + C$

(d) $\frac{1}{2} \ln |\sin x^2| + C$ (e) None of these

16. Evaluate $\int \frac{\cos^3 x - \sin^2 x}{\cos^2 x} \, dx$.

(a) $\frac{\cos^2 x}{2} - \tan x + x + C$ (b) $\sin x - \sec x + C$

(c) $\sin x - \tan x + x + C$ (d) $\sin x - \frac{\tan^3 x}{3} + C$

(e) None of these

7. Evaluate $\int \sec 2x \, dx$.

8. Find the area of the region bounded by the graphs of $f(x) = \sin x$ and $g(x) = \cos x$, for $\pi/4 \leq x \leq 5\pi/4$.

9. Find the volume of the solid formed by revolving the region bounded by $y = \sin x$ and $y = 0$ in the interval $[0, \pi]$ about the y axis.

(a) π^3 (b) $\frac{1}{2}\pi^2$ (c) $2\pi^2$
(d) π (e) None of these

10. Write the definite integral that represents the arc length of one period of the curve $y = \sin 2x$. (Do not evaluate the integral.)

. Evaluate $\int \frac{x+3}{x^2+9} \, dx$.

(a) $\ln|x-3| + C$ (b) $\frac{1}{3}\arctan\frac{x}{3} + C$
(c) $\frac{1}{2}\ln(x^2+9) + \arctan\frac{x}{3} + C$ (d) $\ln(x^2+9) + \frac{1}{3}\arctan\frac{x}{3} + C$
(e) None of these

. Evaluate $\int \frac{dx}{\sqrt{8+2x-x^2}}$.

(a) $\ln\sqrt{8+2x-x^2}$ (b) $\arcsin\frac{x-1}{3} + C$ (c) $\sqrt{8+2x-x^2} + C$
(d) $\frac{1}{3}\operatorname{arcsec}\frac{x-1}{3} + C$ (e) None of these

. Evaluate $\int \frac{x+2}{\sqrt{4-x^2}} \, dx$.

(a) $-\frac{1}{2}\sqrt{4-x^2} + 2\arcsin\frac{x}{2} + C$ (b) $-\sqrt{4-x^2} + 2\arcsin\frac{x}{2} + C$
(c) $\ln|2-x| + C$ (d) $x^2 + 2x + \arcsin\frac{x}{2} + C$
(e) None of these

. Evaluate $\int \frac{5}{x^2+6x+13} \, dx$.

(a) $5\ln|x^2+6x+13| + C$ (b) $5\left(\frac{x^3}{3} + 3x^2 + 13x\right) + C$
(c) $\frac{5}{2}\arctan\frac{x+3}{2} + C$ (d) $-\frac{5}{x} + \frac{5}{6}\ln|x| + \frac{5}{13}x + C$

Find the indefinite integral: $\int \frac{x}{16+x^4}\,dx$.

(a) $\frac{1}{2}\arcsin\frac{x^2}{4}+C$ (b) $\frac{1}{8}\arctan\frac{x^2}{4}+C$ (c) $\frac{1}{4}\arctan\frac{x^2}{4}+C$

(d) $\frac{1}{8}\operatorname{arcsec}\frac{x^2}{4}+C$ (e) None of these

Find the indefinite integral: $\int \frac{x}{81+x^4}\,dx$.

(a) $\frac{1}{2}\arcsin\frac{x^2}{9}+C$ (b) $\frac{1}{18}\arctan\frac{x^2}{9}+C$ (c) $\frac{1}{18}\operatorname{arcsec}\frac{x^2}{9}+C$

(d) $\frac{1}{9}\arctan\frac{x^2}{9}+C$ (e) None of these

Find the indefinite integral: $\int \frac{x}{36+x^4}\,dx$.

(a) $\frac{1}{12}\arctan\frac{x^2}{6}+C$ (b) $\frac{1}{2}\arcsin\frac{x^2}{6}+C$ (c) $\frac{1}{6}\arctan\frac{x^2}{6}+C$

(d) $\frac{1}{12}\operatorname{arcsec}\frac{x^2}{6}+C$ (e) None of these

Evaluate $\int \frac{5x+16}{x^2+9}\,dx$.

5 16 x

Evaluate $\int \frac{1}{\sqrt{-3+4x-x^2}}\,dx$.