

a. 
$$\int \frac{3+x}{2x^2} dx$$

b. 
$$\int (5x^2 + x - 3)(2x^2 - 7) dx$$

c. 
$$\int \frac{6\sqrt[3]{x} - 4\sqrt{x^3}}{5\sqrt[5]{x^8}} dx$$

d. 
$$\int \left( \frac{2}{\sqrt{x^3}} + 5x^3 \right)^2 dx$$

e. 
$$\int \frac{\cos(2x)}{\cos^2 x} dx$$

f. 
$$\int \frac{\sinh x + \cosh x}{e^x} dx$$

g. 
$$\int \frac{\sin(2x)}{\cos^3 x} dx$$

h. 
$$\int \frac{5 + \cos x}{\sin x} dx$$

i. 
$$\int \frac{5 + \cos x}{\sin^2 x} dx$$

j. 
$$\int \cot^2 x dx$$

k. 
$$\int \frac{\sin^3 x}{\cos^2 x} dx$$

l. 
$$\int \frac{\sin^3 x + 2\sin^2 x + \cos^3 x}{\sin^2(2x)} dx$$

# Antiderivatives Using Alg/Trig

(1)

$$a) \int \frac{3+x}{2x^2} dx$$

$$= \int \left( \frac{3}{2} x^{-2} + \frac{1}{2} x^{-1} \right) dx$$

$$= \frac{-3}{2} x^{-1} + \frac{1}{2} \ln|x| + C$$

$$b) \int (5x^2+x-3)(2x^2-7) dx$$

$$= \int (10x^4 - 35x^2 + 2x^3 - 7x - 6x^2 - 21) dx$$

$$= \int (10x^4 + 2x^3 - 41x^2 - 7x - 21) dx$$

$$= 2x^5 + \frac{1}{2}x^4 - \frac{41}{3}x^3 - \frac{7}{2}x^2 - 21x + C$$

$$c) \int \frac{6\sqrt[3]{x} - 4\sqrt{x^3}}{5\sqrt[5]{x^8}} dx$$

$$= \int \frac{6x^{1/3} - 4x^{3/2}}{5x^{8/5}} dx$$

$$= \int \left( \frac{6x^{1/3}}{5x^{8/5}} - \frac{4x^{3/2}}{5x^{8/5}} \right) dx$$

$$= \int \left( \frac{6}{5} x^{-19/15} - \frac{4}{5} x^{-1/10} \right) dx$$

$$= \frac{6}{5} \left( \frac{-3}{-15} x^{-4/15} \right) - \frac{4}{5} \left( \frac{2}{9} x^{9/10} \right) + C$$

$$= \frac{-9}{2} x^{-4/15} - \frac{8}{9} x^{9/10} + C$$

$$d) \int \left( \frac{2}{\sqrt{x^3}} + 5x^3 \right)^2 dx$$

$$= \int \left( 2x^{-3/2} + 5x^3 \right)^2 dx$$

$$= \int \left( 4x^{-3} + 20x^{3/2} + 25x^6 \right) dx$$

$$= -2x^{-2} + 8x^{5/2} + \frac{25}{7}x^7 + C$$

$$e) \int \frac{\cos(2x)}{\cos^2 x} dx$$

$$= \int \frac{\cos^2 x - \sin^2 x}{\cos^2 x} dx$$

$$= \int (1 - \tan^2 x) dx$$

$$= \int [1 - (1 - \sec^2 x)] dx$$

$$= \int \sec^2 x dx$$

$$= \underline{\tan x + C}$$

(2)

$$f) \int \frac{\sinh x + \cosh x}{e^x} dx$$

$$= \int \frac{\frac{e^x - e^{-x}}{2} + \frac{e^x + e^{-x}}{2}}{e^x} dx$$

$$= \int \frac{\frac{2e^x}{2}}{e^x} dx$$

$$= \int 1 dx$$

$$= x + C$$

$$g) \int \frac{\sin(2x)}{\cos^3 x} dx$$

$$= \int \frac{2 \sin x \cos x}{\cos^3 x} dx$$

$$= 2 \int \frac{\sin x}{\cos^2 x} dx$$

$$= 2 \int \sec x \tan x dx$$

$$= \underline{\underline{2 \sec x + C}}$$

$$h) \int \frac{5 + \cos x}{\sin x} dx$$

$$= \int (5 \csc x + \cot x) dx$$

$$= \underline{\underline{5 \ln |\csc x - \cot x| + \ln |\sin x| + C}}$$

$$i) \int \frac{5 + \cos x}{\sin^2 x} dx$$

$$= \int \left( 5 \csc^2 x + \frac{\cos x}{\sin^2 x} \right) dx$$

$$= \int (5 \csc^2 x + \csc x \cot x) dx$$

$$= \underline{\underline{-5 \cot x - \csc x + C}}$$

$$j) \int \cot^2 x dx$$

$$= \int (\csc^2 x - 1) dx$$

$$= \underline{\underline{-\cot x - x + C}}$$

(3)

$$k) \int \frac{\sin^3 x}{\cos^2 x} dx$$

$$= \int \frac{\sin x \sin^2 x}{\cos^2 x} dx$$

$$= \int \frac{\sin x (1 - \cos^2 x)}{\cos^2 x} dx$$

$$= \int \frac{\sin x - \sin x \cos^2 x}{\cos^2 x} dx$$

$$= \int (\sec x \tan x - \sin x) dx$$

$$= \underline{\sec x + \cos x + C}$$

$$l) \int \frac{\sin^3 x + 2 \sin^2 x + \cos^3 x}{\sin^2(2x)} dx$$

$$= \int \frac{\sin^3 x + 2 \sin^2 x + \cos^3 x}{4 \sin^2 x \cos^2 x} dx$$

$$= \int \left( \frac{1}{4} \frac{\sin x}{\cos^2 x} + \frac{1}{2} \frac{1}{\cos^2 x} + \frac{1}{4} \frac{\cos x}{\sin^2 x} \right) dx$$

$$= \int \left( \frac{1}{4} \sec x \tan x + \frac{1}{2} \sec^2 x + \frac{1}{4} \csc x \cot x \right) dx$$

$$= \underline{\frac{1}{4} \sec x + \frac{1}{2} \tan x - \frac{1}{4} \csc x + C}$$