

Worksheet 15 (Answers) - Integration.

$$(1) \int \cos(3x) dx = \frac{1}{3} \sin(3x) + K$$

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

$$(3) \int \sin^2 x \cos^2 x dx = \frac{x}{8} - \frac{\sin(4x)}{32} + K$$

$$(4) \int \sin^2 x \cos^3 x dx = \frac{1}{3} \sin^3 x - \frac{1}{5} \sin^5 x + K$$

$$(5) \int \tan x dx = \ln |\sec x| + K.$$

$$(6) \int \cot x dx = \ln |\sin x| + K.$$

$$(7) \int \csc x dx = -\ln |\csc x + \cot x| + K.$$

$$(8) \int \sin^3 x \cos^5 x dx = -\frac{1}{6} \cos^6 x + \frac{1}{8} \cos^8 x + K$$

$$(9) \int \frac{\cos \theta}{1 + \cos \theta} d\theta = -\csc \theta + \cot \theta + \theta + K.$$

$$(10) \int \frac{\sin \theta}{1 - \sin \theta} d\theta = \sec \theta + \tan \theta - \theta + K.$$

$$(11) \int \sin x \sin(2x) dx = \frac{2}{3} \sin^3 x + K.$$

$$(12) \int e^{3x} dx = \frac{1}{3} e^{3x} + K.$$

$$(13) \int x^3 e^{(x^4)} dx = \frac{1}{4} e^{(x^4)} + K$$

$$(14) \int \frac{e^{\sqrt{x}}}{\sqrt{x}} dx = 2e^{\sqrt{x}} + K$$

$$(15.) \int \frac{x^3}{(4-x^4)^3} dx = \frac{1}{8} (4-x^4)^{-2} + K$$

$$(16.) \int \frac{\sin(\sqrt{\theta})}{\sqrt{\theta} \cos^3 \sqrt{\theta}} d\theta = 4 [\cos(\sqrt{\theta})]^{-1/2} + K.$$

$$(17.) \int \sec^2 x \tan^2 x dx = \frac{1}{3} \tan^3 x + K$$

$$(18.) \int \cot^7 x \csc^2 x dx = -\frac{1}{8} \cot^8 x + K.$$

$$(19.) \int \frac{\cos x}{1-\sin x} dx = -\ln |1-\sin x| + K.$$

$$(20.) \int \frac{e^x}{1+e^x} dx = \ln |1+e^x| + K.$$

$$(21.) \int \frac{e^x + e^{-x}}{e^x - e^{-x}} dx = \ln |e^x - e^{-x}| + K$$

$$(22.) \int \sec^2 x \tan x dx = \frac{\tan^2 x}{2} + K.$$

$$(23.) \int \sin x \cos x dx = \frac{1}{2} \sin^2 x + K.$$

$$(24.) \int \sqrt{3-4x} dx = -\frac{1}{6} (3-4x)^{3/2} + K.$$

$$(24a) \int \frac{y^2 + 4y - 4}{\sqrt{y^3 + 6y^2 - 12y + 9}} dy = \frac{2}{3} (y^3 + 6y^2 - 12y + 9)^{3/2} + K.$$

$$(25.) \int \frac{2 + \ln x}{x + x \ln x} dx = \ln |x + x \ln x| + K$$

$$(26.) \int \sin^2 x \, dx = \frac{x}{2} - \frac{1}{4} \sin 2x + K.$$

$$(27.) \int \cos^2 x \, dx = \frac{1}{4} (2x + \sin 2x) + K.$$

$$(28.) \int \sin^3 x \cos^2 x \, dx = -\frac{1}{3} \cos^3 x + \frac{1}{5} \cos^5 x + K$$

$$(29.) \int \cos^3 x \, dx = \sin x - \frac{1}{3} \sin^3 x + K.$$

$$(30.) \int \frac{2x^3 + 3x^2 - 4x}{x^4 + 2x^3 - 4x^2 + 5} \, dx = \frac{1}{2} \ln |x^4 + 2x^3 - 4x^2 + 5| + K$$

$$(31.) \int \frac{(1 + t^{2/3})^3}{t^{1/3}} \, dt = \frac{3}{8} (1 + t^{2/3})^4 + K.$$

$$(32.) \int \tan^3 x \sec^3 x \, dx = \frac{1}{5} \sec^5 x - \frac{1}{3} \sec^3 x + K.$$

$$(33.) \int \cos(2x) e^{\sin 2x} \, dx = \frac{1}{2} e^{\sin(2x)} + K$$

$$(34.) \int (x-1) \sqrt{x+1} \, dx = \frac{2}{5} (x+1)^{5/2} - \frac{4}{3} (x+1)^{3/2} + K$$

$$(35.) \int x \sqrt{2-3x} \, dx = -\frac{2}{9} \left[\frac{2}{3} (2-3x)^{3/2} - \frac{(2-3x)^{5/2}}{5} \right] + K.$$

$$(36.) \int (\sec^4 x - \sec^2 x \tan^2 x) \, dx = \tan x + K.$$

$$(37.) \int e^{\cot(3x)} \csc^2(3x) \, dx = -\frac{1}{3} e^{\cot(3x)} + K.$$

$$(38.) \int \frac{1}{x} e^{\ln x} \, dx = e^{\ln x} + K.$$

$$(39.) \int \cot^2 x \, dx = -\cot x - x + K.$$

$$(40.) \int \tan^2 x \, dx = \tan x - x + K$$

$$(41.) \int \tan x \, dx = -\ln |\cos x| + K \\ = \ln |\sec x| + K.$$

$$(42.) \int \cot 4x \, dx = \frac{1}{4} \ln |\sin 4x| + K.$$

$$(43.) \int (\sec^2 x - \tan^2 x) \, dx = x + K.$$

$$(44.) \int (\csc^2 x - \cot^2 x) \, dx = x + K.$$

$$(45.) \int \frac{x}{\sqrt{x^2+1}} \, dx = \sqrt{x^2+1} + K.$$

$$(46.) \int x^3 \sqrt{1-x^2} \, dx = -\frac{1}{3} (1-x^2)^{3/2} + \frac{1}{5} (1-x^2)^{5/2} + K$$

$$(47.) \int \sqrt{x} \sin(1+x^{3/2}) \, dx = -\frac{2}{3} \cos(1+x^{3/2}) + K.$$

$$(48.) \int \frac{ax+b}{\sqrt{ax^2+2bx+c}} \, dx = \sqrt{ax^2+2bx+c} + K.$$

$$(49.) \int \frac{\sec \theta \tan \theta}{1+\sec \theta} \, d\theta = \ln |1+\sec \theta| + K.$$