

## Calculus Worksheet #5 Unit 9 Selected Solutions

Integrate each of the following.

$$\begin{aligned} 1. \int \sin^2(5x) dx &= \frac{1}{2} \int [1 - \cos(10x)] dx = \\ &= \frac{1}{2} \int dx - \frac{1}{2} \int \cos(10x) dx \\ &= \frac{1}{2}x - \frac{1}{20} \sin(10x) + C \end{aligned}$$

key relationship for integrating  
even powers of the sine function:

$$\sin^2 k = \frac{1}{2}[1 - \cos(2k)]$$

$$\begin{aligned} 9. \int \tan^4(5x) dx &= \int \tan^2(5x) \tan^2(5x) dx = \\ &= \int \tan^2(5x) [\sec^2(5x) - 1] dx = \\ &= \int \tan^2(5x) [\sec^2(5x) dx] - \int \tan^2(5x) dx = \\ &= \frac{1}{15} \tan^3(5x) - \int [\sec^2(5x) - 1] dx = \\ &= \frac{1}{15} \tan^3(5x) - \int \sec^2(5x) dx + \int dx = \\ &= \frac{1}{15} \tan^3(5x) - \frac{1}{5} \tan(5x) + x + C \end{aligned}$$

$$\begin{aligned} 14. \int \csc^4(x) dx &= \int \csc^2(x) \csc^2(x) dx = \\ &= \int [\cot^2(x) + 1] \csc^2(x) dx = \\ &= \int \cot^2(x) [\csc^2(x) dx] + \int \csc^2(x) dx = \\ &= -\frac{1}{3} \cot^3(x) - \cot(x) + C \end{aligned}$$

$$\begin{aligned} 4. \int \cos^3(x) dx &= \int \cos^2(x) [\cos(x) dx] = \\ &= \int [1 - \sin^2(x)] [\cos(x) dx] = \\ &= \int \cos(x) dx - \int \sin^2(x) [\cos(x) dx] \\ &= \sin(x) - \frac{1}{3} \sin^3(x) + C \end{aligned}$$