Problem Set
Section 7.2

Trigonometric Integrals

$$\sin^2 x + \cos^2 x = 1, \quad \tan^2 x + 1 = \sec^2 x, \quad 1 + \cot^2 x = \csc^2 x,$$

$$\cos^2 x = \frac{1 + \cos 2x}{2}, \quad \sin^2 x = \frac{1 - \cos 2x}{2}$$

$$\begin{aligned} \sin A \cos B &= \tfrac{1}{2}\left[\sin(A - B) + \sin(A + B)\right], \\ \sin A \sin B &= \tfrac{1}{2}\left[\cos(A - B) - \cos(A + B)\right], \\ \cos A \cos B &= \tfrac{1}{2}\left[\cos(A - B) + \cos(A + B)\right], \end{aligned}$$

Problem 1

Find the integral $\int \sin^3 x \cos^2 x dx$.

Problem 2

Find the integral $\int \sin^2 x \cos^4 x dx$.

Problem 3

Find the integral $\int \csc^6(2x)\cot^3(2x)dx$.

Problem 4

Find the integral $\int \sec^4 x \left(1 - \tan^2 x\right) dx$.

Problem 5

Find the integral $\int_0^{\frac{\pi}{6}} \sin(5x)\cos(3x)dx$.

Problem (DO NOT SUBMIT)

Find the integral $\int e^x \sec^4(e^x) \tan^3(e^x) dx$.