Section 8.2: Trigonometric Integrals

Identities needed in this section: (more identities on last page)

- $\sin^2 x + \cos^2 x = 1$
- $\tan^2 x + 1 = \sec^2 x$
- $\sin^2 x = \frac{1}{2}(1 - \cos 2x)$
- $\cos^2 x = \frac{1}{2}(1 + \cos 2x)$

TYPE I: Integrals of the form $\int \sin^m x \cos^n x \, dx$

Case 1: *EITHER* m or n (or both) is odd.

a.) $\int \sin^4 x \cos^3 x \, dx$

b.) $\int \sin^3 x \, dx$

c.) $\displaystyle\int \frac{\cos^5 x}{\sin^7 x}\,dx$

Case 2: *BOTH* m and n are even.

a.) $\displaystyle\int_0^{\frac{\pi}{2}} \sin^2 x \cos^2 x\,dx$

b.) $\displaystyle\int \frac{\cos^2(\ln x)}{x}\,dx$

TYPE II: Integrals of the form $\int \sec^m x \tan^n x \, dx$

Case 1: The power on *TANGENT* is odd.

a.) $\int \tan^3 x \sec^3 x \, dx$

b.) $\int \cot^5 x \csc^2 x \, dx$

Case 2: The power on *SECANT* is is even

a.) $\int \tan^4 x \sec^4 x \, dx$

TYPE III: Integrals of the form

- $\int \sin(Ax)\cos(Bx)\,dx$: Use the identity $\sin A \cos B = \frac{1}{2}(\sin(A-B)+\sin(A+B))$
- $\int \sin(Ax)\sin(Bx)\,dx$: Use the identity $\sin A \sin B = \frac{1}{2}(\cos(A-B)-\cos(A+B))$
- $\int \cos(Ax)\cos(Bx)\,dx$: Use the identity $\cos A \cos B = \frac{1}{2}(\cos(A-B)+\cos(A+B))$

a.) $\int \sin 3x \cos x \, dx$