Section 7.2 - Trigonometric Integrals
In this section we learn how to evaluate integrals of the form

$$\int \sin^m x \cos^n x \, dx \qquad \int \sin mx \cos nx \, dx$$
$$\int \tan^m x \sec^n x \, dx \qquad \int \sin mx \sin nx \, dx$$
$$\int \cos mx \cos nx \, dx$$

We use a variety of techniques, including

(i) Trigonometric identities:

Pythagorean identities

$$\sin^2 x + \cos^2 x = 1$$
$$\tan^2 x + 1 = \sec^2 x$$

Half-angle identities

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

Double-angle identity

$$\sin x \cos x = \frac{1}{2} \sin 2x$$

Product identities

$$\sin A \cos B = \frac{1}{2} [\sin(A - B) + \sin(A + B)]$$
$$\sin A \sin B = \frac{1}{2} [\cos(A - B) - \cos(A + B)]$$
$$\cos A \cos B = \frac{1}{2} [\cos(A - B) + \cos(A + B)]$$

(ii) u-substitution. For the u-substitution we will often be looking for what to let du be, then using trig. identities to write everything else in terms of what u will be.