Trigonometric Integration

1. Find:

$$\int \cos(x) \sin^2(x) \, dx$$

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

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2. Recall the Pythagorean Theorem (the trigonometric version of $a^2 + b^2 = c^2$)

$$\sin^2(x) + \cos^2(x) = 1.$$

(a) Use the above theorem to write down a relationship between $\tan(x)$ & $\sec(x)$.

(b) Use the above theorem to write down a relationship between $\cot(x)$ and $\csc(x)$.

3. Consider the strategy we developed to integrate expressions with sines and cosines. Try and develop a parallel strategy when working the following examples:

$$\int \tan^6(x) \sec^4(x) \, dy \qquad\qquad \int \tan^4(x) \, dx$$

$$\int \tan(x) \sec^4(x) \, dy$$

4. Record your strategy by finishing the following sentences: Given $\int \tan^m(x) \sec^n(x) \, dx$,

(a) if n is even...

(b) if m is odd...