Math 132 - October 6, 2017

Sections Covered: 7.2

Trig Identies:

- $1 + \tan^2\theta = \sec^2\theta$
- $\sin A \sin B = \frac{1}{2}\left[\cos(A-B) - \cos(A+B)\right]$
- $\cos A \cos B = \frac{1}{2}\left[\cos(A-B) + \cos(A+B)\right]$
- $\sin A \cos B = \frac{1}{2}\left[\sin(A+B) + \sin(A-B)\right]$
- $\sin^2 x = \frac{1}{2}(1 - \cos 2x)$
- $\cos^2 x = \frac{1}{2}(1 + \cos 2x)$

Trig Integral Stategies

$\int \sin^m x \ \cos^n x \ dx$

- If m, n (or both) are odd. Use either $u = \sin x$ or $u = \cos x$.
- If m, n are both even, use half angle identities.

$\int \tan^m x \ \sec^n x \ dx$

- Use either $u = \tan x$ or $u = \sec x$
- If the above doesn't work, try something else.

$\int \sin(nx) \ \cos(mx) \ dx$

- Use product to sum formulas

$\int \sec x \ dx$ or $\int \csc x \ dx$

- This is a trick. Just be ready to look this integral up if needed.

Warm-up Problems

1. Integrate with $u = \sin x$: $\int \sin^4 x \cos^5 x \ dx$
2. Integrate with $u = \cos x$: $\int \sin^3 x \cos^5 x \ dx$
3. Integrate with $u = \tan x$: $\int \tan x \ \sec^6 x \ dx$
4. Integrate with $u = \sec x$: $\int \tan x \ \sec^6 x \ dx$
5. Integrate using the product to sum formulas above: $\displaystyle\int \sin(2x)\sin(17x) \ dx$

Class Problems

6. **Clicker** Identify the strategy to integrate the integrals below

   Answers for all parts of this question

   A. Let $u = \sin x$.
   B. Let $u = \cos x$
   C. Let $u = \tan x$
   D. Let $u = \sec x$
   E. Some other trig identity, something tricky or maybe its impossible.

   (a) $\displaystyle\int \sin^4 x \ \cos^5 x \ dx$

   (b) $\displaystyle\int \cos^2 x \ dx$

   (c) $\displaystyle\int \sec^4 x \ dx$

   (d) $\displaystyle\int \tan^4 x \ dx$

   (e) $\displaystyle\int \sin^5 x \ \cos^4 x \ dx$

   (f) $\displaystyle\int \sin^4 x \ \cos^6 x \ dx$

7. Compute the integrals in Problem 6

8. Below are a variety of trig integral problems. Some are routine, some are tedious, and some (I think) are more difficult.

(a) $\int \sin^3 x \cos^2 x \, dx$

(b) $\int \sin^2 x \cos^7 x \, dx$

(c) $\int \sin^4 x \, dx$

(d) $\int \sin^6 x \ \cos^2 x \, dx$

(e) $\int \sec^3 x \, dx$

(f) $\int \sec^4 x \, dx$

(g) $\int \tan^2 x \, dx$

(h) $\int \tan^4 x \, dx$

(i) $\int \dfrac{\cos^2 x}{1 + \sin x} \, dx$

(j) $\int (\sec^2 x)\sqrt{5 + \tan x} \, dx$

(k) $\int \dfrac{\cos^5 x \ \sin x}{1 - \sin^2 x} \, dx$

(l) $\int \dfrac{\sin 2x}{\cos^4 x + \sin^4 x} \, dx$