MATH 1910, Fall 2016
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Sections: 201, 202

Name:_____

Integration Notes/Review

Fundamental Identities

- $$\sin^2 x + \cos^2 x = 1$$
- $$1 + \tan^2 x = \sec^2 x$$
- $$1 + \cot^2 x = \csc^2 x$$
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Double-Angle Formulas

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

Differentiation of Trigonometric and Inverse Trigonometric Functions

- $$\frac{d}{dx} \sin x = \cos x$$
- $$\frac{d}{dx} \cos x = -\sin x$$
- $$\frac{d}{dx} \tan x = \sec^2 x$$
- $$\frac{d}{dx} \csc x = -\csc x \cot x$$
- $$\frac{d}{dx} \sec x = \sec x \tan x$$
- $$\frac{d}{dx} \cot x = -\csc^2 x$$
- $$\frac{d}{dx}(\sin^{-1} x) = \frac{1}{\sqrt{1 - x^2}}$$
- $$\frac{d}{dx}(\cos^{-1} x) = \frac{-1}{\sqrt{1 - x^2}}$$

- $$\frac{d}{dx}(\tan^{-1} x) = \frac{1}{1+x^2}$$

Integration Formulas (recently covered)

- $$\int \tan u \; du = \ln|\sec u| + C$$
- $$\int \cot u du = \ln|\sin u| + C$$
- $$\int \sec u \; du = \ln|\sec u + \tan u| + C$$
- $$\int \csc u \; du = \ln|\csc u - \cot u| + C$$
- $$\int \frac{du}{\sqrt{a^2 - u^2}} = \sin^{-1}\frac{u}{a} + C$$
- $$\int \frac{du}{a^2 + u^2} = \frac{u}{a}\tan^{-1}\frac{u}{a} + C$$

Use the trig. identities together with the methods of integration you know so far to find the indefinite integrals below. Once you are done check your answer using the tables in the back of the book.

1. $\int \sin^2 u \; du$
2. $\int \cos^2 u \; du$
3. $\int \tan^2 u \; du$
4. $\int \cot^2 u \; du$
5. $\int \sin^3 u \; du$
6. $\int \cos^3 u \; du$
7. $\int \tan^3 u \; du$
8. $\int \cot^3 u \; du$
9. $\int \sec^3 u \; du$
10. $\int \csc^3 u \; du$

Find a formula for the following indefinite integrals, then check your answer using the table on p.402 or the one in the back of the book.

1. $\int \sin^n u \; du$
2. $\int \cos^n u \; du$
3. $\int \tan^n u \; du$

Make sure you read and understand the summary of section 8.3 on p. 409.