Math 103: Logarithmic, Trigonometric and Exponential Integrals

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Tuesday December 6, 2011

Outline

Area Between Curves

Theorem

If f and g are continuous functions with $f(x) \geq g(x)$ throughout $[a, b]$, then the **area of the region between the curves $y = f(x)$ and $y = g(x)$ from a to b** *is given by*

$$A = \int_a^b [f(x) - g(x)]dx$$

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Steps to Find the Area Enclosed by Curves

1. Draw a picture illustrating the inclosed region.
2. Find the points of intersection for all pairs of curves.
3. Decide if you will integrate with respect to x or y.
4. Write down the integral (or sum of integrals) that represents the area and evaluate it.

Trig Integrals

Know these and know how to derive them.

1. $\int cos^2(x)dx = \frac{x}{2} + \frac{sin(2x)}{4} + C$
2. $\int sin^2(x)dx = \frac{x}{2} - \frac{sin(2x)}{4} + C$
3. $\int tan(x)dx = ln|sec(x)| + C$
4. $\int cot(x)dx = ln|sin(x)| + C$
5. $\int sec(x)dx = ln|sec(x) + tan(x)| + C$
6. $\int csc(x)dx = -ln|csc(x) + cot(x)| + C$

Log and Exponent Integrals

Recall the following

1. $\int e^x dx = e^x + C$
2. $\int a^x dx = \frac{a^x}{ln(a)} + C$
3. $\int \frac{1}{x} dx = ln|x| + C$
4. $log_a(b) = \frac{ln(b)}{ln(a)}$