Unit #1: Integration Review
Topic: Indefinite Integrals
Objective: SWBAT evaluate an indefinite integral by using various rules for antidifferentiation.

Warm Up #2:

Complete the Quick Reference Guide for Basic Derivatives and Integrals

Indefinite Integrals

A differential equation is an equation that has a derivative in it. Solving a differential equation involves finding the original function from which the derivative came. The general solution involve a constant of integration $(+C)$.

$$\text{If} \quad \frac{dy}{dx} = f(x) \quad \text{then} \quad y = \int f(x)dx$$

The indefinite integral of $f(x)$ is a **FUNCTION** and answers the question, "What function when differentiated gives $f(x)$?"

All derivatives MUST be simplified completely BEFORE you try to find an antiderivative!!!

Examples: Find the general antiderivative for each of the following.

a) $\int \frac{4x^5 - 3x^3 + x^2}{2x} \, dx$	b) $\int (\frac{2}{x^3} + \sqrt{x} - 2\cos x)\, dx$	c) $\int 3\sec^2 x - \frac{4}{x} + e^{2x} \, dx$

Problem Set #2: *Find the general antiderivative for each of the following by using the power rule. Remember, you may need to simplify first.* ☺

1) $\int (-9x^2 + 10x)dx$	2) $\int 2\sqrt[3]{x} - 7\ dx$
3) $\int \sin(2x + 3)dx$	4) $\int \frac{7}{3\sqrt{x}}\ dx$
5) $\int 2e^{-x}\ dx$	6) $\int \frac{x^3 + 1}{x}\ dx$
7) $\int 5x^{3/2} + 2x^{1/2} - 7x + 3\ dx$	8) $\int \frac{2x^3 - 1}{x^2}\ dx$
9) $\int \frac{1}{3 - x}\ dx$	10) $\int 6x^2 - \frac{e^{x+1}}{2} + \frac{1}{\sqrt{x}}\ dx$

11) $5\int \frac{x^2 - 36}{x + 6} \, dx$

12) $\int \frac{2x^3 - 3x^2 + 5}{x^2} \, dx$

13) $\int \sqrt{x}\,(x + 1)dx$

14) $\int x^2 + sec^2x - secxtanx \, dx$

15) $\int 4e^{3x} dx$

16) $\int \frac{1}{2x} + 3 \, dx$

17) $\int \frac{-4}{x^3} - \frac{8}{x^5} \, dx$

18) $-\int x - \frac{1}{x^2} - \frac{3}{x} dx$

19) $\frac{1}{2}\int sinx - 3e^x + \frac{4}{x} \, dx$

20) $\int \frac{1}{3}cosx - \frac{1}{3x^4} + 1 \, dx$

Answer Key:

1) $-3x^3 + 5x^2 + C$	2) $\frac{6}{5}x^{\frac{5}{3}} - 7x + C$
3) $-\frac{1}{2}\cos(2x + 3) + C$	4) $\frac{14}{3}x^{\frac{1}{2}} + C$
5) $-2e^{-x} + C$	6) $\frac{1}{3}x^3 + \ln|x| + C$
7) $2x^{5/2} + \frac{4}{3}x^{3/2} - \frac{7}{2}x^2 + 3x + C$	8) $x^2 + \frac{1}{x} + C$
9) $-\ln|3 - x| + C$	10) $2x^3 - \frac{1}{2}e^{x+1} + 2x^{\frac{1}{2}} + C$
11) $\frac{5}{2}x^2 - 30x + C$	12) $x^2 - 3x - \frac{5}{x} + C$
13) $\frac{2}{5}x^{5/2} + \frac{2}{3}x^{3/2} + C$	14) $\frac{1}{3}x^3 + \tan x - \sec x + C$
15) $\frac{4}{3}e^{3x} + C$	16) $\frac{1}{2}\ln|x| + 3x + C$
17) $\frac{2}{x^2} + \frac{2}{x^4} + C$	18) $-\frac{1}{2}x^2 - \frac{1}{x} + 3\ln|x| + C$
19) $-\frac{1}{2}\cos x - \frac{3}{2}e^x + 2\ln|x| + C$	20) $\frac{1}{3}\sin x + \frac{1}{9x^3} + x + C$