HW: Note Card is due Friday!

DO NOW:

Go over multiple choice problems and Partial Fraction problems.

③ $\int \frac{x-1}{x(x-2)}\,dx = \frac{1}{2}\ln|x| + \frac{1}{2}\ln|x-2| + C$

④ $\left(\sqrt{t} - \frac{1}{\sqrt{t}}\right)^2 = t - 2 + \frac{1}{t}$

⑥ $\int \frac{dx}{\sin^2 2x} = \int \csc^2 2x\,dx$

⑨ $\int e^{2\theta} \sin e^{2\theta}\,d\theta$

$u = e^{2\theta} \quad du = 2e^{2\theta}$

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$\int \frac{x-11}{x^2+3x-4}\,dx = \int \frac{3}{x+4}\,dx - \int \frac{2}{x-1}\,dx$

$\frac{3}{(x+4)} \quad \frac{-2}{(x-1)}$

$\int \frac{1}{x+k}\,dx = \ln|x+k|$

$\int \frac{2x+21}{2x^2+9x-5}\,dx = 4\int \frac{1}{2x-1}\,dx + -\int \frac{1}{x+5}\,dx$

$\int \frac{1}{2x-1}\,dx = \frac{1}{2}\int \frac{1}{u}\,du$

$u = 2x-1$

$du = 2dx$

$= \frac{1}{2}\ln|2x-1| + C$

$$\int x e^{-x}\,dx = (-e^{-x})x - \int -e^{-x}\,dx$$

$u = x \quad dv = e^{-x}dx$

$du = 1\,dx \quad v = -e^{-x}$

$$= -xe^{-x} + \int e^{-x}\,dx$$

$$= -xe^{-x} - e^{-x} + C$$

$$\frac{d\,e^{2x}}{dx} = 2e^{2x}$$

$$\int e^{2x}\,dx = \frac{e^{2x}}{2}$$

Find antiderivatives for ln x and arctan x using integration by parts

$$\int \ln x\,dx = x\ln|x| - \int \frac{1}{x}\cdot x\,dx$$

$u = \ln x \quad dv = dx$

$du = \frac{1}{x}dx \quad v = x$

$$= x\ln|x| - \int 1\,dx$$

$$= x\ln|x| - x + C$$

$$\int \arctan x\,dx = x\arctan x - \int \frac{x}{1+x^2}\,dx$$

$u = \arctan x \quad dv = dx$

$du = \frac{1}{1+x^2}dx \quad v = x$

$$= x\arctan x - \frac{1}{2}\ln|x^2+1| + C$$

How to Choose the Technique of Integration to Use

Recognize as a basic rule $\int \sin x\,dx = -\cos x + C$

Manipulate algebraically: Multiply out, split a fraction, divide $\int \left(\sqrt{t} - \frac{1}{\sqrt{t}}\right)^2 dt$

U-substitution: composition, with derivative of inner function $\int 2x \sin(x^2)\,dx$

Partial Fractions: Linear function over a quadratic function that factors $\int \frac{5}{x^2-4}\,dx$

Integration by Parts: "Product" with at least one part you can integrate easily; Choose u by LIATE $\int xe^x\,dx$

On worksheet (page from our textbook):

In your group, go through the circled problems and JUST DECIDE WHICH METHOD YOU WOULD USE! Skip #2

When you finish this, actually integrate the problems listed at the top

Note: You have the answers to all the problems, w/ hints, in your answer packet for this unit

GREATEST HITS!

For the Unit 6 test, you must be able to:

A) Solve an **indefinite** integral/find an antiderivative for any integrand.

1) First consider, can I **work backwards**? If my integrand is the derivative of some function, then I can easily find the antiderivative. If no, then...

2) Is there a way I can **rewrite** the integrand OR do something **algebraically** to make the problem more clear? Then consider...

3) Is there a **composite** function in the integrand? Is there a product of a **function and** a form of its **derivative**? Then, use **u-substitution**. Most times, I can just work backwards after this, OR I might need to consider...

4) Is there a product of two separate and distinct types of functions? If yes, then use **integration by parts** and remember ILATE when choosing a u.

5) Lastly...if after I consider *u-substitution*, I realize I am working with an integrand that is a **proper rational function**, with a factorable denominator (linear and non-repeating factors), then use **integration by partial fractions.**

B) Evaluate a **definite** integral for any integrand remembering to "translate" the limits of integration when using a u-substitution.

Note: Don't forget that we did a lot of work in Unit 5, recognizing when integrands on a finite interval form known geometric figures. USE AREA WHENEVER YOU CAN to solve a definite integral! While this is not a focus on the assessment for Unit 6, this is important to the larger picture of the work that we do with evaluating integral statements.