**Calculus** **Ch. 5.2 Natural Log Integrals**

What would happen if we attempted to apply power rule for this problem?

$$\int \frac{1}{x}\,dx$$

**Recall Derivative Rule:**

$$\frac{d}{dx}\ln u = \frac{u'}{u}$$

**Natural Log Integral Rule**

$$\int \frac{1}{u}\,du = \ln|u| + C$$

***Example* 1**: $\int \frac{2x}{x^2+1}\,dx$

***Example* 2**: $\int \frac{1}{x\ln x}\,dx$

***Example* 3**: $\int \frac{x^2+x+1}{x^2+1}\,dx$

**Ch. 5.2 More Trig Integral Rules:**

1) $\int \tan u \, du = -\ln|\cos u| + C$

2) $\int \cot u \, du = \ln|\sin u| + C$

3) $\int \sec u \, du = \ln|\sec u + \tan u| + C$

4) $\int \csc u \, du = -\ln|\csc u + \cot u| + C$

**Example 4:**

$a)$ $\int \tan x \, dx$

$b)$ $\int \cot x \, dx$

**Example 5: (method 1) long division**

$$\int \frac{x^3 - 6x - 20}{x + 5} dx$$

**(Example 5: Method 2) synthetic division**

$$\int \frac{x^3 - 6x - 20}{x + 5} dx$$