Calc12 Date:_____
Mr. C. Sdoutz

Unit 5: Logarithmic, Exponential, & Inverse Trigonometric Functions
5.2 Natural Log & Integration

Since

$$\frac{d}{dx}[\ln x] = \frac{1}{x}$$

Then

$$\boxed{\int \frac{1}{x}dx = \ln|x| + c}$$

*need absolute value since we can only log positive numbers

note: the power integration law $\int x^n\,dx = \frac{x^{n+1}}{n+1} + c$ does not work on $\frac{1}{x}$

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

ex.

$\int \frac{2}{x}dx$

ex.

$\int \frac{x^2+1}{x^3+3x}dx$

*integration of rational functions could lead to a natural log antiderivative, thus we use substitution method (let $u =$ the denominator)

ex.

$$\int \tan x \, dx$$

ex. Determine the area under $y = \frac{x}{x^2+1}$ on $[0, 3]$.

If the degree of the numerator is equal or greater than the degree of the denominator try long division to split up the integrand.

$$\frac{dividend}{divisor} = quotient + \frac{remainder}{divisor}$$

ex.

$$\int \frac{x^2 + x + 1}{x^2 + 1} dx$$

ex.

$$\int \frac{(\ln x)^3}{x} dx$$

Practice Questions

Pg. 327/# 1 – 14, 19, 20, 23, 24, 33 – 38, 51 – 54, 57, 58, 61, 63, 69, 70