Name _____

Class _____

Part 1 – Explore Integrating ln *x*

Problem of the Day: $\int \ln x dx$.

One can quickly find the solution to the indefinite integral by entering in a CAS system. Do this now and complete the equation.

$\int \ln x dx$ =

Yet, more important than the answer is how can we get it without the use of technology. List the techniques for integration that you know. Which technique will give a result similar to the one above?

Recall the formula for integration by parts: $\int uv'dx = uv - \int vu'dx$.

Make your choices for *u* and *v′*, calculate *u′* and *v*, and record the results below. Hint: when making your choice for *u*, remember the mnemonic device **LIPET**.

L – log (or natural log)

I – inverse

P – polynomial

E – exponential

T – trigonometric

u = *u′* =

v′ = *v* =

Complete the process obtaining the result we got before.

Check your answer by differentiating the result.

Finally, confirm your solution graphically. Graph *y* = ln(*x*) and your result. With a partner, discuss how the two graphs relate to each other.

Part 2 – Extension/Homework

Integrate each of the following. Show all work. Verify your answers using the handheld.

1. $\int \tan^{-1} x dx$

2. $\int \ln(2x) dx$

3. $\int xe^x dx$

4. $\int x^2 e^x dx$

5. $\int x \sin x dx$