Reminder

- Handouts are due Friday.
- Check WebAssign for online homework.
- Written homework is due Thursday.
- Syllabus last page sign and return by Friday.

Daily Quiz

- Go to Socrative.com and complete the quiz.
- Use your full name.
- Room Name: HONG5824

5.6 Integration by Parts - Your choice matters

Integrating by parts Find $\int x \sin x \, dx$.

Recall that last time, we found that $\int x \sin x \, dx = -x \cos x + \sin x + C$.
What if we choose a different u and dv?

5.5 How to choose your U and dV: LIATE

Integration by parts requires us to know the derivative of u and the anti-derivative of dv. Since some functions are harder to integrate than others, we let dv be a function that is **easier to integrate** while we let u be the function that is **harder to integrate**.

Following this heuristic, we have a rule that helps us pick the right u and we let the remainder be dv: **LIATE**.

When choosing u, follow the below priority list.

1. **L**ogarithmic functions (e.g. $\log x$)
2. **I**nverse Trig functions (e.g. $\arctan x$)
3. **A**lgebraic functions (e.g. $x^2, \frac{1}{x^7}$)
4. **T**rig functions (e.g. $\tan x$)
5. **E**xponential functions (e.g. $2^x, e^x$)

5.6 Integration by Parts

Evaluate $\int \ln x \, dx$.

5.6 Integration by Parts

Integrating by parts twice Find $\int t^2 e^t \, dt$.

What happens if you don't follow LIATE?

Integrating by parts twice Find $\int t^2 e^t \, dt$.

5.6 Integration by Parts (Substitution before By-Parts)

$$\int \cos\sqrt{x}\, dx$$

5.6 Integration by Parts (Definite Integrals)

$$\int_a^b f(x)g'(x)\,dx = f(x)g(x)\Big]_a^b - \int_a^b g(x)f'(x)\,dx$$

5.6 Integration by Parts

$$\int_0^1 \arctan(x)\ dx$$