

Practice Assessment 6

Integration by Parts

These **practice problems** are designed to help you **prepare for our course exams** and **assess your understanding** of the course material at the expected level. Aim to complete them **in class, during tutoring, office hours, or on your own**, and try to solve them **without notes or a calculator**, just like on the **actual exams**. Remember, **practice makes perfect**, so don't hesitate to **ask for help** if you get stuck.

Integration by parts formulas:

$$\int f(x)g'(x)dx = f(x)g(x) - \int f'(x)g(x)dx.$$

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

1. Compute the following integrals:

(a) $\int x \cos(x)dx.$

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

(c) $\int x^2 e^x dx.$

(d) $\int e^x \cos(x)dx.$

2. Compute the following integrals:

(a) $\int_0^{\frac{\sqrt{\pi}}{2}} x^3 \cos(x^2) dx.$

(b) $\int_0^1 x(x+2)^8 dx.$

(c) $\int_0^1 x^3 e^{2x} dx.$