MATH 236 CALCULUS 2
INTEGRATION BY PARTS

1. Prove the integration by parts formula:

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

- Step 1. Find $\dfrac{d}{dx}[f(x)g(x)]$. What rule are you using?
- Step 2. Take the indefinite integral of both sides of the equation that you got in the previous step.
- Step 3. Rearrange the terms in the previous step to reach the integration by parts formula.
- Step 4. Write a complete mathematical proof.

2. Evaluate the integrals.

a. $\int 4x \sec^2(2x)dx$

b. $\int_1^e x^3 \ln x dx$

c. $\int \sin^{-1} y dy$

d. $\int e^{2x} \cos(3x)dx$