

## Math 102 — Integration by parts

*Summary.* Try each of the following problems together in a small group.

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**Problem 1.** Find the following definite integrals using integration by parts. Remember to start by making a choice for  $u$  and for  $dv$ . Through practice, these choices will get easier, but we often choose  $u$  to be something that gets “simpler” when it’s differentiated (like a how polynomial goes to a lower degree when differentiated).

a.  $\int x \sin x \, dx$

b.  $\int x e^{5x} \, dx$

c.  $\int x^5 \ln(4x) \, dx$

d.  $\int x^3 e^{x^2} \, dx$  *Hint: try doing a substitution first. Use the letter  $y$  instead of  $u$  when doing your substitution.*

e.  $\int x^2 e^{4x} \, dx$  *Hint: you’ll need to do integration by parts twice.*