

M408S Homework 4. Due Monday, February 11

1) In this problem, we are going to compute $\int \sin(x) \cos(x) dx$ in several different ways:

- a) Compute it by u-substitution with $u = \sin(x)$.
- b) Compute it by u-substitution with $u = \cos(x)$.
- c) Compute it by integration by parts with $u = \sin(x)$, $dv = \cos(x)dx$. (Plus algebra).
- d) Compute it by integration by parts with $u = \cos(x)$, $dv = \sin(x)dx$. (Plus algebra).
- e) Compute it with the double-angle formula $\sin(2x) = 2 \sin(x) \cos(x)$. Express your final answer in terms of $\sin(x)$ and $\cos(x)$ (not $\sin(2x)$ and $\cos(2x)$).

If you did the calculations correctly, you got three different-looking answers from these five procedures. How can it be that all three are correct? (If you're unsure, try taking the derivatives of your answers to check that they all work.)

Book problems:

Section 7.1: Problems 17, 37, 42, and 70.

Section 7.2: Problems 14, 22, 24, 47.