

MATH 141 Calculus 2

Fall 2015

A Geometric interpretation of Integration by Parts

This is an attempt to demystify the integration by parts formula by thinking about it in terms of areas above and below the curve. The concept described here is for interest only and is non-examinable.

- a) Find the area of the region bounded by the lines $x = 0$, $y = 0$, $x = \frac{\pi}{2}$ and the curve $y = \sin x$.
- b) Using part a), find the area of the region bounded by the lines $x = 0$, $y = 0$, $y = \frac{\pi}{2}$ and the curve $y = \arcsin x$.
- c) Using part b), find the area of the region bounded by the lines $x = 0$, $y = 0$, $x = 1$ and the curve $y = \arcsin x$.
- d) Now compute $\int_0^1 \arcsin x dx$ by first using the substitution $u = \sin x$, then doing integration by parts. Observe the similarity between this and part c).

Problem 72 in Section 7.1 (problem 70 for 7th edition) describes how to do this for inverse functions in general.