

Section 5.6 Worksheet: Substitution Method Assigned problems: Exercises pp. 295-297, #2, 8, 13, 18, 25, 32, 43, 56, 59, 82 (due Monday, 11/5)

1. Here's another way to write an integral that is ripe for use of the substitution rule:

$$h(g(b)) - h(g(a)) = \int_a^b h'(g(x))g'(x)dx$$

Here we see how the substitution rule related to the chain rule. In the integral

$$\int_a^b \sqrt{\sin(x)} \cos(x)dx$$

Do you recognize this function as the derivative of an $h(g(x))$? Which function plays the role of h , and which the role of g ?

2. Note the role of the differential – it is important, and cannot be ignored or dropped!
3. How is the substitution rule modified for definite integrals? Why do the limits of integration change in the substitution rule for definite integrals?

Notes: This (the substitution rule) is the first (and arguably most useful) of several rules that help us to solve integrals. It is so important to integration because compositions are so common, and the chain rule (by which we differentiate compositions) is so important to differentiation.

The basic idea in substitution is that you recognize the function $g(x)$ and its derivative $g'(x)$ (multiplying dx) in an integral, and make the substitution to simplify the integral. You may still not know h , but you're a little ahead, because the substitution cleans up the appearance of the integral.