Homework 9

Math 252

Due March 17th at 11:59 PM

Textbook Exercises

§3.4: 197, 199, 207, 209, 211, 217

§3.7: 347, 349, 351, 357, 371

§4.1: 9, 11, 29, 30

§4.2: 66, 67, 68, 69, 84, 85, 86, 87, 88

§4.3: 119, 125, 129, 135, 157, 159

An Involved Problem

In this exercise, you'll be solving a particularly complicated integral. This problem is required, and I'll say upfront that this is the problem I'll grade for credit on this assignment. I'll provide some hints in the problem, and feel free to ask if you have any questions.

Find $\int \frac{1}{x^3 - 1}\, dx$.

Some hints:

- You'll need to use the difference of cubes formula: $a^3 - b^3 = (a - b)(a^2 + ab + b^2)$.
- You'll need to use partial fractions, u-sub, and possibly trig sub, in some order.

- You'll need to complete a square at some point: given $x^2 + bx + c$, add and subtract $\left(\frac{b}{2}\right)^2$ to get

$$x^2 + bx + \left(\frac{b}{2}\right)^2 + c - \left(\frac{b}{2}\right)^2,$$

  then factor the first three terms.