MATH 101 Lab 3

In this lab we look at some difficult integrals that can be solved easily by Maple. The first question asks you to find an integral of a rational function. Keep in mind that Maple omits the absolute value signs when the result involves logarithm of the absolute value of an expression, so these must be added when you write the final result. Use the command *convert(f(x),parfrac,x);* to find a partial fraction decomposition of the given rational function. The command *factor(f(x));* can be used to factor either the entire fraction or just the denominator of the fraction.

The second question asks you to compare the Maple output with the result obtained "by hand". Different computational approaches might result in different looking answers, but the answers must differ by at most a constant; that is, it should always be possible to show that two different answers are equivalent in the above sense. You might find useful to consult section 7.6 of the text.

Hand in a commented worksheet in lab class.

Question 1

Find the partial fraction decomposition of the function

$$f(x) = \frac{12x^5 - 7x^3 - 13x^2 + 8}{100x^6 - 80x^5 + 116x^4 - 80x^3 + 41x^2 - 20x + 4}.$$

Evaluate the integral

$$\int f(x) \, dx.$$

Question 2

Find the partial fraction decomposition of the function

$$h(x) = \frac{1}{x^4 + 4}$$

and use the result to find the integral

$$\int h(x) \, dx$$

"by hand". Use Maple to find the same integral and compare the results. Show that the two results are equivalent in the sense discussed above.