Calculus Lab, Week 3

Our goal this week is to answer some mathematical questions using Maple, then write up our solutions in LaTeX. For the lab, write a LaTeX report with two sections (one section for each question below).

Before next week's lab, upload the tex and PDF files to a new CLEO folder for the week. You do not have to turn in the Maple worksheet. There's a template LaTeX file you can use on the class website to get started.

What are we looking for in this week's lab?

- Use of figures: Be sure to label the figure, then reference it in the text somewhere.
- Use of quotation marks: Use quotes for something.
- Use of *displaymath* in describing mathematics.
- Other stuff: Use of "we", using math mode, etc.

1 Exercise: Find the Pattern

In this exercise, we want to see if there is a pattern to the integral:

$$\int \frac{1}{(x+p)(x+q)}\,dx$$

where p, q are integers. Try a few first to see if you can find a pattern- For example,

$$\int \frac{1}{(x-3)(x+2)}\,dx \qquad \int \frac{1}{(x+2)(x+6)}\,dx \qquad \int \frac{1}{(x-3)^2}\,dx$$

You might want to look at two cases- One where $p \neq q$, and one where $p = q$. In your LaTeX file, give the problem statement and your solution write up.

2 Exercise: More on Plotting

Suppose that

$$f(x) = \mathrm{e}^{-x}\cos(x^2)$$

and let F be the antiderivative, which by the FTC can be written as:

$$F(x) = \int_{-1}^{x} f(t)\,dt.$$

In Maple, plot the function f together with its derivative and antiderivative on the interval $-2 \leq x \leq 4$. Label the three functions using a legend. Label the $x-$axis as "Time", and include the end result in a figure in your LaTeX document.