MAT200
Franklin College, Spring 2004
Dr. Prisner

MathCad Homework

In order to emphasize the importance of you making yourself familiar with MathCad, I will grade all these exercises, and I have put multiple weight on some of them. This homework is due on Thursday, April 22.

Exercise 1: (Counts like 2 ordinary exercises) Define the functions $f(x) = x^2 - 3x + 4$, $g(x) = \frac{x^2+1}{x-1}$, and $h(x) = \sqrt[3]{x^2 - x + 1}$. Evaluate $f(2), g(3)$, and $h(4)$. Make a table showing the x-values for x between -2 and 8, with increments of 1. Make another table showing the values $g(x)$ for x between 2 and 4 with 0.2 increment. Graph both f and g in the same coordinate system with $-2 < x < 2$ and appropriate y-range.

Exercise 2: (Counts like 2 ordinary exercises) Define the function $h(x) = \sqrt[3]{x^2 - x + 1}$. Find the slope of the tangent to h at $x_0 = 2$. Find the formulas defining $h'(x)$ and for $h''(x)$. Graph all three functions into the same coordinate system for $0 < x < 4$. Looking at the graph, tell me where the points of inflections of h are. Do the same for the function $k(x) = (x^2 - x + 1)^{1/3}$. Do you notice any difference?

Exercise 3: Try to find antiderivatives of the functions

$$f(x) = \frac{\ln(3x-1)}{x^3},$$

$$g(x) = x^2(e^{2x} - e^{x^3-1}),$$

$$h(x) = \frac{x^3 - x^2 + 5x - 1}{x^2 - 2x + 1},$$

and

$$h(x) = \ln(x)e^{x^2}.$$

Which of the results could you also obtain without the help of MathCad?

Exercise 4: Define the functions $f(x) = \ln(x)$ and $h(x) = x\ln(x) - x$. Verify that $h'(x) = f(x)$. Now define also the function

$$g(x) = \int_1^x f(t)dt.$$

Graph all three functions f, g, h in a common coordinate system for $0.01 \leq x \leq 4$. What do you observe about g and h?