

# Maths 3194: Maple Project

## Spring 2011

**Due Date:** No later than 2:10 on Thursday, April 28.

**Points:** This project is out of 10 points.

**Instructions:** You are to work alone on this project, although you may ask for minor assistance from any of the departmental faculty. You should rely heavily on the help files within Maple and the Internet to aid you finishing this project.

You have two options for how to turn in your project. First, you can directly print out any work from Maple, so that the instructor can see what you entered as well as what the corresponding output was. If there is any unnecessary output, you can feel free to delete that before printing and submitting it for a grade. The second option is to turn your work into a pdf document that shows all pertinent output, which you can send to the instructor via email. Only pdf attachments will be accepted, and the student is responsible for making sure that everything exports properly.

### Project Problems:

**Problem 1:** Compute  $\int_0^{\pi} \sin^{12}(x) dx$ .

**Problem 2:** Find the second derivative of  $f(x) = e^{x^x} x^4$ .

**Problem 3:** Compute  $\sum_{k=1}^{\infty} \frac{1}{k^2}$ .

**Problem 4:** In the same plot, show the graphs of  $f(x) = x$ ,  $g(x) = x^2$ ,  $\ln(x)$  and  $k(x) = e^x$ , where  $-2 \leq x \leq 2$ . Make each function a different color.

**Problem 5:** Make a 3-dimensional plot of the function  $z = f(x, y) = \sin(x) + \sin(y)$ , where  $-10 \leq x, y \leq 10$  and  $-3 \leq z \leq 3$ .

**Problem 6:** Program a *do-loop* in Maple to generate the squares of the integers 1, 2, 3, ..., 24, 25.

**Problem 7:** Solve the initial value problem

$$y'' + 6y' + 10y = \sin(2x); y(0) = y'(0) = 1.$$

**Problem 8:** In Calc II we learn that for  $|\square| < 1$ ,

$$\frac{1}{1 - \square} = \sum_{i=0}^{\infty} \square^i = 1 + \square + \square^2 + \square^3 + \dots$$

Thus, we can expand certain rational functions into infinite polynomials, or series. If we wish to expand the rational function  $f(x) = \frac{1+x}{1-3x+x^2}$  into a series, what is the coefficient of  $x^{200}$ .