

# Math 480b: Homework Assignment 2

Due: Wednesday, April 15, 2009

**Problem 1:** Define the following symbolic expressions:

1.  $x^2 \sin\left(\frac{1}{x}\right)$
2.  $t^2 - \sqrt{t}$
3.  $C \cdot \left( \frac{a - b \cot(\theta)}{r^4} + \frac{b \csc(\theta)}{s^4} \right)$

**Problem 2:** Replace  $y$  by  $\sin(x)^2 - 1/y$  in the expression  $x^y + y^x$  using the `subs` command.

**Problem 3:** Expand out the expression  $(ax + by^2 + cz)^4$ .

**Problem 4:** Usage Sage to compute the following integrals:

1.  $\int x^3 \cos(x^4 + 2) dx$
2.  $\int \frac{x}{\sqrt{1-4x^2}} dx$
3.  $\int_0^{T/2} \sin\left(\frac{2\pi t}{T} - \alpha\right) dt$ , where  $\alpha$  is some fixed constant.
4.  $\int x^2 \cos(x^3) \cos(\sin(x^3) + 2) dx$
5.  $\int \sqrt{\frac{1-x}{1+x}} dx$

**Problem 5:** Create an interact that has a box where you can type in a function  $f(x)$ . It should output a [blue plot of  \$f\(x\)\$](#)  and a [red plot of the derivative  \$\frac{df}{dx}\$](#)  on the interval  $[0, 5]$ .

**Problem 6:** Draw 10 concentric red circles in the plane (a 2D plot).