# Math 31B — Homework 01

**Instructions** Remember to show all of your work to get credit. Please do this assignment on a seperate sheet of paper. The assignment is due at the beginning of class on Friday.

1. 7.3: 113

2. 7.3: 95, 98, 103

3. 7.1: 53, 54

4. 7.1 81, 82

5. (a) Using of the definition of the derivative show that

$$\frac{d}{dx}[b^x] = m(b)b^x$$

   where

$$m(b) = \lim_{h \to 0} \frac{b^h - 1}{h}.$$

   (b) What is the exact value of $m(b)$.

6. Find an inverse function for $f(x) = x^2 + 1$ when $x \geq 1$.

7. Consider the function

$$l(x) = \int_1^x \frac{c^2}{t} dt$$

   where $c$ is a constant. What is the base of this logarithm?

8. Consider the logarithm $l(x) = 2 \log_5(x)$. What is the base of this logarithm?

9. What is the hyperbola associated to the logarithm $\log_{10}(x)$? How about $\log_a(x)$ where $a$ is a positive real number bigger than one?.

10. What is the derivative of $\ln(x)$? What is the derivative of $\log_{10}(x)$? What is the derivative of $\log_a(x)$?

11. (For fun) Go find an unsuspecting victim (if you live in a dorm there should be many) and ask them to solve the equation $e^x + x = y$ for $x$.