

MTH4100 Exercise sheet 1

## Calculus 1, Autumn 2012 Prof Bill Jackson

These questions are designed to help you understand the material covered in week n lectures. Exercise sheets will typically be handed out in the Tuesday lecture of week n + 1. You will get help on them in your exercise class on Tuesday or Wednesday of the same week. You should write up your solution to the starred question (\*) clearly and hand it in to your personal tutor during your week n + 2 exercise class for feedback. Put your *full name and student number* on the top of your solution. It is important that you try to do ALL of the questions, not just the starred question.

1. Prove that

$$\left|\frac{a}{b}\right| = \frac{|a|}{|b|}$$

for all  $a, b \in \mathbb{R}$  with  $b \neq 0$ .

(\*)2. Determine the set of all real numbers  $x \in \mathbb{R}$  that satisfy

$$x^2 - 4x - 12 < 0$$

(a) by solving the inequality, and

- (b) by plotting the graph of  $y = x^2 4x 12$ .
- 3. Determine the set of all real numbers  $x \in \mathbb{R}$  that satisfy

$$|2x - 1| + |4x + 1| < 3$$

by solving the inequality.

4. Determine the set of all real numbers  $x \in \mathbb{R}$  that satisfy

$$\sqrt{1-x^2} \le -x$$

- (a) by solving the inequality, and
- (b) by plotting the graphs of y = -x and  $y = \sqrt{1 x^2}$ .