## MTH4100 <br> Exercise sheet 1

## Calculus 1, Autumn 2012 <br> 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 $b \neq 0$.
$(\star) 2$. Determine the set of all real numbers $x \in \mathbb{R}$ that satisfy

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

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

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

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

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

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

