

**MATH454 HOMEWORK 2**  
**DUE THURSDAY, SEPTEMBER 12**

*Exercise 1.* Do Exercise 2.4 from the textbook.

*Exercise 2.* Do Exercise 2.6 from the textbook.

*Exercise 3.* Do Exercise 2.9 from the textbook.

*Exercise 4.* Do Exercise 2.10 from the textbook.

*Exercise 5 (Reach).* Do Exercise 2.13 from the textbook. (See pages 18–19 for the necessary definitions.)

*Exercise 6.* Do Exercise 3.1 from the textbook.

Let  $R$  be a binary relation on a set  $A$ . Say that  $R$  is *well-founded* if for any nonempty  $X \subseteq A$  there is  $x \in X$  so that there is no  $y \in X$  so that  $y R x$ . Such an  $x$  is called an  *$R$ -minimal* element of  $X$ .

*Exercise 7.* Prove that a (strict) linear order  $(L, <)$  is a well-order if and only if  $<$  is well-founded.

*Exercise 8.* Give two different examples of well-founded relations which are not total orders. (Drawing a picture is a perfectly acceptable way to give an example.)