Math 241, Introduction to Abstract Algebra – Fall 2011–2012
Course website: `http://people.aub.edu.lb/~kmakdisi/`
Problem set 1, due Friday, October 7 at the beginning of class

Exercises from Fraleigh:

Section 0, exercises 1, 2, 3, 12.
Section 1, exercises 22, 29, 32, 33.
Section 2, exercises 8, 9, 23, 26.
Section 3, exercise 33.
Section 4, exercise 8.

Additional Exercises (also required):

Exercise A1.1: (Adapted from Jacobson)

Let $a \in \mathbf{R}^*$ and $b \in \mathbf{R}$. Consider the function $f_{a,b} \in Fun(\mathbf{R}, \mathbf{R})$ given by

$$f_{a,b}(x) = ax + b.$$

a) Show that f is a bijection, and find its inverse function.

b) Let G be the set of functions $\{f_{a,b} | a \in \mathbf{R}^*, b \in \mathbf{R}\}$. Show that G is a group, where the group operation is composition of functions. (Thus G is a subgroup of $Bij(\mathbf{R}, \mathbf{R})$.)

c) Bonus problem: Show that the group G is isomorphic to a subgroup of $GL_2(\mathbf{R})$.

Look at, but do not hand in:

Section 0, exercises 5–10, 14, 15, 29–32, 36.
Section 1, exercise 34.
Section 2, exercises 1–5, 14–16, 27–30.
Section 3, exercises 3–7, 18, 19, 29–32.