

**Date due: November 10, 2008.** Hand in the 7 starred questions.

**Section 3.3** In class we will spend very little time on this section. It consists mostly of definitions which I think you probably already know. In the exercises there are some standard facts which it might be a good idea to have seen, and I list these exercises.

3.21, 3.22, 3.23, 3.24, 3.25, 3.27(ii)

**Section 3.4** I am going to skip many things in this section, from page 135 onwards.

3.28\*, 3.31, 3.34\*, 3.36

**Section 3.5** 3.41\*, 3.44, 3.45, 3.49, 3.50(i)\* and 3.50(ii)\*, 3.52, 3.53\*, 3.54, 3.55, 3.56\*

VV Decide which of the following are ideals of the ring  $\mathbb{Z} \times \mathbb{Z}$ :

(a)  $\{(a, a) \mid a \in \mathbb{Z}\}$

(b)  $\{(2a, 2b) \mid a, b \in \mathbb{Z}\}$

(c)  $\{(2a, 0) \mid a \in \mathbb{Z}\}$

(d)  $\{(a, -a) \mid a \in \mathbb{Z}\}$

WW Prove that every (two-sided) ideal of  $M_n(R)$  is equal to  $M_n(J)$  for some (two-sided) ideal  $J$  of  $R$ . (Show first that the set of entries of matrices in an ideal of  $M_n(R)$  form an ideal in  $R$ .)