Before starting this homework, look at the problems that have answers (marked with an ‘A’). Spend some time on each one to see if you can figure out how to do it before looking at the answer. This should help prepare you to do the homework questions.

Where you need to prove that something is decidable, you need to construct a TM. You can use the TMs that were constructed in the proofs in Chapter 4 as a substep of the TM that you create.

**Question 1: Exercise 4.2**

In addition to giving the construction, also prove that your construction is correct: that the TM is a decider and that it decides the desired language. You just need to give the proof of the construction for this question, and any questions where it is specifically asked.

**Question 2: Exercise 4.3**

**Question 3: Exercise 4.4**

This is the language of grammars, in which each grammar accepts the empty string, as well as other possible strings.

**Question 4: Exercise 4.6 Part b, c, e, f**

This is problem 4.6 in the 3rd edition, problem 4.5 in the 2nd edition.

**Question 5: Exercise 4.8**

This is problem 4.8 in the 3rd edition, problem 4.7 in the 2nd edition.

Give pseudo code that will output all triples. You are basically giving an enumerator TM.

**Question 6: Exercise 4.13**

This is problem 4.13 in the 3rd edition, problem 4.12 in the 2nd edition.

Prove that your construction is correct.

**Question 7: Exercise 4.21**

This is problem 4.21 in the 3rd edition, problem 4.19 in the 2nd edition.

**Question 8: Exercise 4.11**

This is problem 4.11 in the 3rd edition, problem 4.10 in the 2nd edition.