DEPARTMENT OF MATHEMATICS

MATHS 190 Lecture 5 Summary

In this lecture we illustrate two important observations:

- We do arithmetic in a specific way when we think about time on clocks.
- Modular arithmetic is also used in bar codes and ISBN codes.

Lecture 5 was based around the following question:

Question: What do clocks and bar codes have in common?

In this lecture we illustrated the idea of crazy clock (or modular) arithmetic. This is the arithmetic you use to answer questions like: What time will it be in 100 hours? or On what day of the week will my 98th birthday fall? Modular arithmetic is also used to detect errors in supermarket price scanners and bank cheques.

In this lecture we:

- Defined the notion of equivalence for integers 'mod p' where p was an arbitrary positive integer, beginning with the example of $p = 12$ relevant to ordinary 'clock' arithmetic.
- Worked out examples of equivalence calculations.
- Illustrated the application of modular arithmetic to error detection in supermarket bar codes (13-digit European Article Numbers), and 11-digit ISBN codes.

Before you come to the next lecture: You should spend an hour or two thinking and reading about the ideas presented in the lecture. You should also:

- Read Section 2.6 of the textbook

Other activities you could do if you have time are:

- Read about how modular arithmetic is used in coding, in section 2.5 of the textbook.