

Math 112 homework #7. Due 11/21

Abel has left the mathematicians enough to keep them busy for 500 years

– Charles Hermite, on Neils Abel (1802-1829) of “Abelian group” fame

- (1) Review what we did in class last week, then read Chapter 6 in the book.
Note: we skipped all of Chapter 5.
- (2) Do the following exercises from pages 180-186 in the course notes
 - 6.1
 - 6.3 part a) only
 - 6.5
 - 6.6
 - 6.8
 - 6.9
 - 6.11
 - 6.13
- (3) Find the remainder when you divide each of the following numbers by 13 (i.e. find the residue mod 11). You should be able to do this easily without a calculator, by using one of our theorems.
 - a) $3 \times 4 \times 5 \times 6 \times 7 \times 8 \times 9$
 - b) $19 + 20 + 21 + 22 + 23 + 24 + 25 + 26$
 - c) $123 + (21 \times 4) + 142$
- (4) You are probably familiar with the fact that numbers which are divisible by 5 are precisely those with a 5 or a 0 in the one’s digit. Why is this true? Use mod 5 arithmetic to explain this.
- (5)
 - a) In the group \mathbb{Z}_5 under addition, how many times do you have to add 2 to itself to get 0?
 - b) In the group of units $U(5)$ under multiplication, how many times do you have to multiply 2 by itself before you get 1?
 - c) In the group \mathbb{Z}_7 under addition, how many times do you have to add 2 to itself to get 0?
 - d) In the group of units $U(7)$ under multiplication, how many times do you have to multiply 2 by itself before you get 1?