

**MATHEMATICS 2001**  
**GROUPWORK DUE SEPTEMBER 30**

TASKS

Reminder: you should produce a Groupwork Report (handwritten is fine) and a PDF uploaded to D2L (typset, LaTeX or Word or whatever).

Reminder: elect a leader, scribe and presenter.

- (1) Reminder: You should still probably be able to elect a scribe and presenter who has not yet scribed or presented. If you were elected presenter but did not actually present in class, that doesn't count as having presented, so you may be elected again.
- (2) **Main Task 1: Take up homework done so far.** As in previous weeks.
- (3) **Main Task 2: Group Homework.**
  - (a) Prove the following statement (hint: contrapositive): If  $x(y+1)$  is even, then  $x$  is even or  $y$  is odd.
  - (b) Prove the following statement: If  $ab \equiv 0 \pmod{2}$  and  $a+b \not\equiv 0 \pmod{2}$ , then exactly one of  $a$  and  $b$  is odd.
  - (c) Read page 111 of your text together as a group. Discuss the proof much like we do in class on presentation days.
  - (d) Now read the Proposition at the bottom of page 115 of your text. This gives a streamlined example of proof by contradiction for an "if-then" (conditional statement) theorem.
  - (e) Produce a proof by contradiction of the following statement: If  $n^2 \not\equiv 1 \pmod{3}$ , then  $n \not\equiv 1 \pmod{3}$ .
  - (f) Ponder: Would the previous theorem be easier to prove by contrapositive? Tell me your thoughts.
  - (g) Produce a proof by contradiction of the following statement: There does not exist any pair of integers  $x$  and  $y$  which satisfy  $2x + 4y = 1$ .
- (4) Fill out your groupwork report and have everyone sign. **This is due in class.**
- (5) The scribe will prepare a PDF of your proofs to hand in on D2L. **I appreciate getting these early on Friday so I can look through them.**