

# MAS114 Homework Problems

Week 6 (hand in in week 8)

1. Find all integer solutions to the following linear diophantine equations:

(a)  $10x + 17y = 88$ ;

(b)  $9x + 15y = 100$ .

2. Look again at the proof that if a prime  $p$  divides  $ab$ , then  $p$  divides  $a$  or  $b$ . Simplify it to obtain a proof that, for any integers  $n$ ,  $a$ , and  $b$ , if  $n \mid ab$  and  $\gcd(n, a) = 1$ , then  $n \mid b$ .

3. **Challenge:** Prove that there are infinitely many primes of the form  $4n - 1$ . (*Hint: Try thinking about numbers of the form  $4p_1p_2 \dots p_k - 1$ .*)

*[Please hand in attempts to the Challenge problem on a separate sheet of paper so they can make their way to Dr Cranch more easily.]*