**1.8 Introduction to Proofs**

**Q4 Use a direct proof to show that every odd integer is the difference of two squares.**

*If n*  is odd, we can write *n* = 2*k* + 1 for some integer *k*.

Then−  = + 2*k* + 1 −

= 2*k*+1 which is *n*.

**Q6. Prove that if *n* is a perfect square, then *n* + 2 is not a perfect square.**

Let n = . If m = 0, then n + 2 = 2, which is not a perfect square

The smallest perfect square greater than n is , = + 2m + 1 = n + 2m + 1 > n + 2 ·

1 + 1 > n + 2.

Because of that **, n + 2** cannot be a perfect square.

**Q18. Prove that**   **= if and only if *m* = *n* or *m* = −*n*.**

**We consider two cases**

If m = n, then of course = ;

if m = −n, then = =

**For the second case** = ;

Simplify the equation to - then (m + n)(m − n) = 0.

conclude that either m + n = 0, so m = −n

or m − n = 0, so m = n

which complete the prove