

Max Gebski - Answers to Test Flight Problem Set

Question 4

**Prove that every odd natural number is of one of the forms  $4n + 1$  or  $4n + 3$ , where  $n$  is an integer.**

An even number is a number which is divisible by 2 with no remainder, otherwise defined as  $2k$  where  $k \in \mathbb{Z}$ . An odd number is a number which is not divisible by 2, otherwise defined as  $2k + 1$  where  $k \in \mathbb{Z}$ . When  $k$  is kept the same, the difference between the even and the odd number is 1. Because of this, even and odd numbers alternate. Thus, when writing an odd number in the form of  $4n + 1$ , this does not cover all odd numbers. Because an odd number added with an even number we can add 2 to  $4n + 1$ ,  $4n + 1 + 2 = 4n + 3$ . This will cover all odd numbers.