

### Test Flight Problem Set 3

Proposition: For any integer  $n$ , the number  $n^2 + n + 1$  is odd.

The proposition is True

Proof by induction:

Let  $f(n) = n^2 + n + 1$

$f(1) = 1 + 1 + 1 = 3$ , so  $f(1)$  is odd

$f(n+1) = (n+1)^2 + n + 1 + 1$  by the definition of  $f(n)$

$$= n^2 + 2n + 1 + n + 1 + 1$$

$$= n^2 + n + 1 + 2n + 2$$

$$= f(n) + 2n + 2$$

Clearly,  $2n + 2$  is even

According to the induction hypothesis,  $f(n)$  is odd, and an odd number plus an even number is an odd number, therefore  $f(n+1)$  is odd. This completes the proof.