

Test Flight Problem Set 5

Proposition: For any integer n , at least one of n , $n + 2$, $n + 4$ is divisible by 3

Proof by cases

Case 1: n has remainder 0 on division by 3

Then n is divisible by 3 and the proposition is true for this case

Case 2: n has remainder 1 on division by 3

Then $n + 2$ has remainder 0 on division by 3 and is therefore divisible by 3 so that the proposition is true for this case

Case 3: n has remainder 2 on division by 3

Then $n + 4$ has remainder 0 on division by 3 and is therefore divisible by 3 so that the proposition is true for this case

Since n must have remainder 0, 1 or 2 on division by 3 there are no other cases and the proof is complete.