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**ICS 2019 Problem Sheet #2**

**Problem 2.1**

Proof: By contrapositive instead of proving “n is not divisible by 3 if it is not divisible by 15”, we “prove n is divisible by 3 if it is divisible by 15”.

Assuming “n is divisible by 3 if it is divisible by 15” Then

Let us suppose m is any number

or

or

or

Therefore, we know that 3 is also a factor of n therefore n is divisible by 3.

Hence, “If n is divisible by 3, it also divisible by 15” . This is a contradiction. Thus “If n is not divisible by 3, it is also not divisible by 15” must be true.

**Problem 2.2**

Proof:

We Prove by Induction

* Base case:

We show that the equation is true for n = 1. Setting n = 1, the equation becomes

S1

and this is true since the square of 1 is 1.

* Induction step:

For some random number n

Sn

We assume that this is true therefore for Sn+1

Sn+1 = Sn + (n +1) th term

= Sn + (2(n+1) -1)2

=

…… solving the equation, we get

=

This shows that the equation holds for n + 1.

It follows by induction that

holds for all integers greater than or equal to 1.