**Mathematical Induction 1**

1. Prove that .

Let P(n) be the proposition :

For P(1), L.H.S.==R.H.S., ∴P(1) is true.

Assume P(k) is true for some natural number k, that is,

………(1)

For P(k + 1),

, by (1)

∴ P(k + 1) is true.

∴ By the Principle of Mathematical Induction, P(n) is true for all natural numbers, n.

2. Prove by Mathematical Induction: , for all integers .

Let P(n) be the proposition : , for all integers .

For P(2), L.H.S.==R.H.S., ∴P(2) is true.

Assume P(k) is true for some integerk,. that is,……(1)

For P(k + 1), , by (1)

∴ P(k + 1) is true.

By the First Principle of Mathematical Induction, P(n) is true for integers .

3. Prove  by mathematical induction.

Let

For , L.H.S. = , R.H.S. =

is true.

Assume is true for some , that is

For ,

, by (1)

Now, writing , then

By (2),

(use Factor Theorem)

is true.

By the principle of mathematical induction, is true for all .

4. Prove by mathematical induction.

Let

For , L.H.S. = , R.H.S. =, is true.

Assume is true for some , that is

For ,

, by (1)

is true.

By the principle of mathematical induction, is true for all .

5. Prove  by mathematical induction.

Let

For , L.H.S. = , R.H.S. =

is true.

Assume is true for some , that is

For ,

, by (1)

is true.

By the Principle of mathematical induction, is true **.**

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**29/12/2020**