**Mathematical Induction 2**

1. Prove by Mathematical induction,

where n ∈**N**.

P(n) :

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

Assume P(k) is true for some k∈ N, that is,………(1)

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

∴ P(k + 1) is true.

By the Principle of Mathematical Induction, P(n) is true ∀ n ∈ N.

2. Prove by mathematical induction:

for the first positive integers.

Let

For . is true.

Assume is true for some that is

For

, by (1).

is true.

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

3. Prove by mathematical induction: for all natural values of .

Let (1)

(2) where .

For (1)

(2) .

is true.

Assume is true for some that is

where .

For

(1)

, by

(2)

is true.

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

Therefore for all natural values of .

4. Prove that is divisible by for all non-negative integers, .

Let where .

For

Assume is true for some

We have

For ,

by (1)

,

is true.

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

**Yue Kwok Choy**

**8/1/2021**