Class Discussion

Unit 6 Topic 5 Part 2 DeMoivre's Theorem

Objective: student understands and know the DeMoivre's theorem.

1. Introduction of mathematical induction before the proof of the theorem

Use (sum of the measures of the interior angles of a triangle is 180 degree and give an example of finding an unknown measure of an angle, and the Fibonacci sequence to highlight the difference between inductive reasoning and deductive reasoning before giving the induction method)

Method of mathematical Introduction

1. base step: prove the argument is true at n = 1

2. inductive step:

Assume that at n=k, the argument is true. Based on the assumption if a valid statement can be obtained that at n=k+1 the argument is also true,

3. The argument is validated based on the method of mathematical induction.

DeMoirve's Theorem

If $z = r(\cos\theta + i\sin\theta)$ is a complex number, and $n$ is a positive integer then

$$z^n = r^n(\cos n\theta + i\sin n\theta)$$

Ex 1: Prove The DeMoivre Theorem

Ex 2: Evaluate $(-1+i)^{20}$

Ex 3: Find the nth root of $z = a + bi$ , $\sqrt[3]{i} = ?$