

TEACHING AND LEARNING SERIES
FACULTY OF ELECTRICAL ENGINEERING

Module 8

SOLUTION MANUAL OF ELEMENTARY MATHEMATICS



**TAY CHOO CHUAN
HAMZAH SAKIDIN
ZURAINI OTHMAN**

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© FIRST PUBLISHED 2008
Universiti Teknikal Malaysia Melaka

ISBN: 978-983-2948-56-8

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Perpustakaan Negara Malaysia

Cataloguing-in-Publication Data

Tay Choo Chuan

Solution manual of elementary mathematics. Module 8 / Tay Choo Chuan,
Hamzah Sakidin, Zuraini Othman.

(Teaching and learning series : faculty of electrical engineering)

Bibliography: p. 99

ISBN 978-983-2948-56-8

1. Mathematic--Study and teaching (Higher). I. Hamzah Sakidin.

II. Zuraini Othman. III. Title. IV. Series.

510.711

Published in Malaysia by:

Penerbit Universiti
Universiti Teknikal Malaysia Melaka
Hang Tuah Jaya, Ayer Keroh, 75450 Melaka

Printed in Malaysia by

UH TRADING
36, TU42, Tmn Tasik Utama,
Ayer Keroh, 75450 Melaka.

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Preface

One of the most challenging aspects of mathematics learning is to give students suitable examples and exercises which can improve their understanding.

This solution manual of Elementary Mathematics is designed to serve as a study guide for engineering students of Universiti Teknikal Malaysia Melaka (UTeM). The topics are based on the syllabus of Elementary Mathematics teaching in UTeM.

The material in this book will cover questions and answers for:

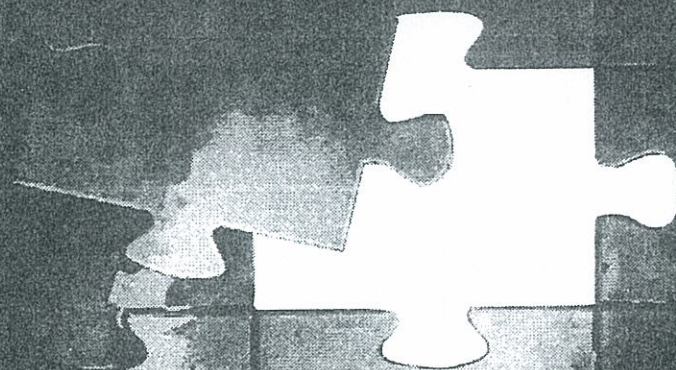
- ❖ Fundamental Concepts of Algebra
- ❖ Complex Numbers
- ❖ Matrices
- ❖ Geometric Coordinates
- ❖ Functions and Graphs
- ❖ Trigonometry
- ❖ Polynomials

An excellent student must have an initiative to learn before being taught by lecturers. By using this manual, students can be more prepared before attending a tutorial session. The examples are presented in a sequence of steps with full details so that students can follow systematically.

In preparing this manual, we would like to thank all the individuals involved. Such comments and feedback are always welcome.

CHAPTER ONE

FUNDAMENTAL CONCEPTS OF ALGEBRA



CHAPTER ONE

FUNDAMENTAL CONCEPTS OF ALGEBRA

Introduction

In this chapter, we will work with numbers. Therefore we need to know about this number and understand its properties. After being introduced to the number systems, we can look at the operation of the numbers such as exponents, surd and logarithm. Algebra is about operations and the order of applying these operations in solving problems in quadratic equations and partial fractions.

Objectives

After completing these tutorials, students should be able to:

Tutorial 1

- ❖ Express each of the given numbers as a quotient $\frac{a}{b}$.
- ❖ Write each of the given inequalities in interval notation and show them on the real number line.
- ❖ Simplify the given index expressions.
- ❖ Solve the following index equations.

Tutorial 2

- ❖ Express in terms of the simplest possible surds.
- ❖ Rationalize the denominator and simplify.
- ❖ Express in logarithm form.
- ❖ Express in index form.
- ❖ Simplify the given logarithm expressions.
- ❖ Solve the given logarithm equations.

$$\frac{x^3 - 1}{(x+1)(x-2)} = (x+1) + \frac{3x+1}{(x+1)(x-2)}$$

$$\Rightarrow \frac{3x+1}{(x+1)(x-2)} = \frac{A}{x+1} + \frac{B}{x-2}$$

$$3x+1 = A(x-2) + B(x+1)$$

$$\text{when } x = 2 \Rightarrow B = \frac{7}{3}$$

$$\text{when } x = -1 \Rightarrow A = \frac{2}{3}$$

$$\text{so, } \frac{x^3 - 1}{(x+1)(x-2)} = (x+1) + \frac{2}{3(x+1)} + \frac{7}{3(x-2)}$$

(c)

$$\frac{x^3 - 4x}{(x-2)(x+1)^2}$$

Solution:

$$\frac{x^3 - 4x}{(x-2)(x+1)^2} = \frac{x^3 - 4x}{x^3 - 3x - 2}$$

By long division

$$\begin{array}{r} 1 \\ x^3 - 3x - 2 \overline{) x^3 - 4x} \\ \underline{-(x^3 - 3x - 2)} \\ -x + 2 \end{array}$$

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Universiti Teknikal Malaysia Melaka

ISBN 978-983-2948-56-8



9 789832 948568