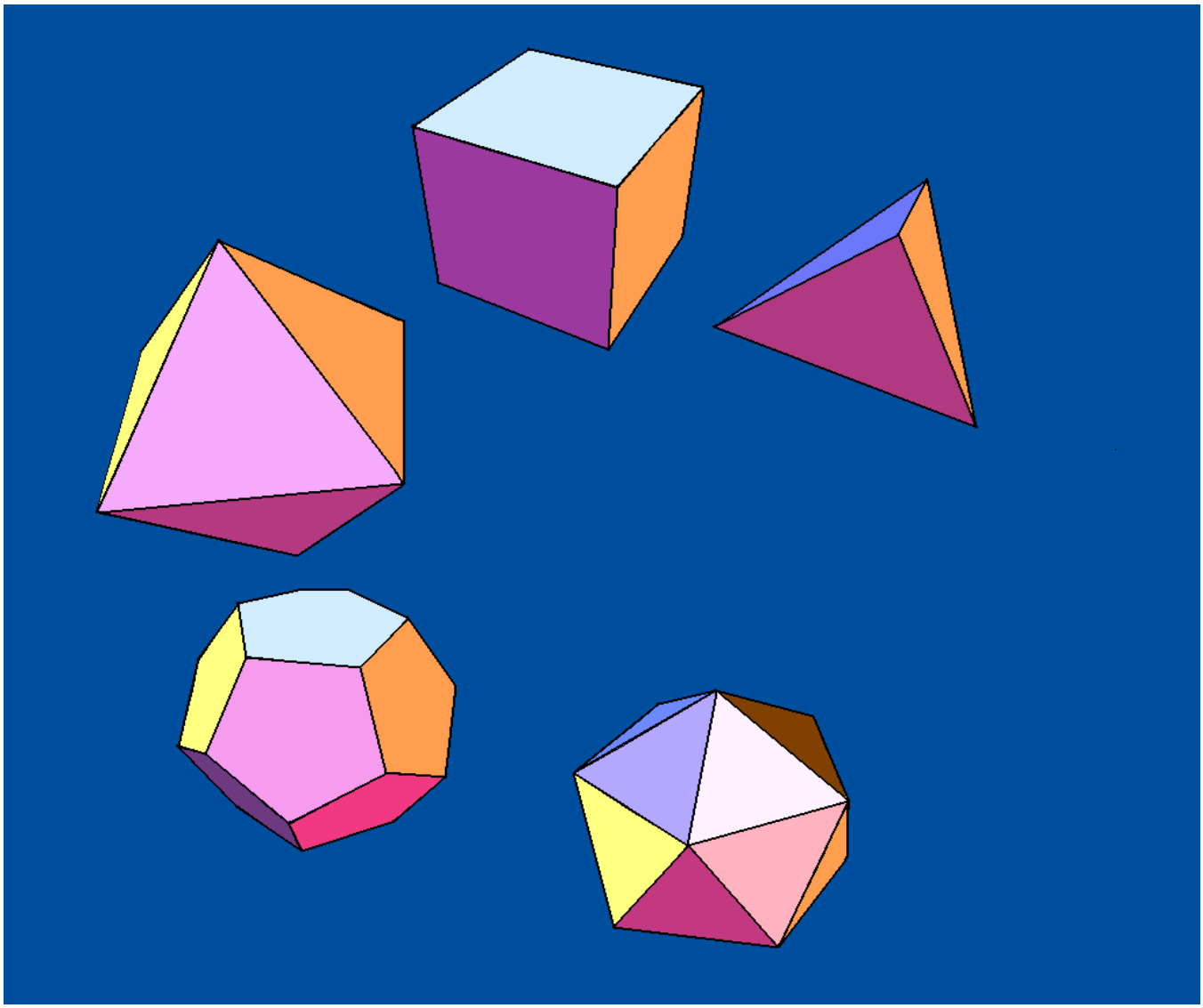
Introduction to Calculus

Volume II

by J.H. Heinbockel



The regular solids or regular polyhedra are solid geometric figures with the same identical regular polygon on each face. There are only five regular solids discovered by the ancient Greek mathematicians. These five solids are the following.

the tetrahedron (4 faces)

the cube or hexadron (6 faces)

the octahedron (8 faces)

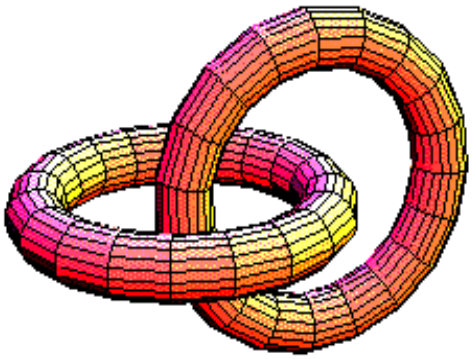
the dodecahedron (12 faces)

the icosahedron (20 faces)

Each figure follows the Euler formula

$$\text{Number of faces} + \text{Number of vertices} = \text{Number of edges} + 2$$

$$F + V = E + 2$$



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This Introduction to Calculus is intended to be a free ebook where portions of the text can be printed out. Commercial sale of this book or any part of it is strictly forbidden.

Preface

This is the second volume of an introductory calculus presentation intended for future scientists and engineers. Volume II is a continuation of volume I and contains chapters six through twelve. The chapter six presents an introduction to vectors, vector operations, differentiation and integration of vectors with many application. The chapter seven investigates curves and surfaces represented in a vector form and examines vector operations associated with these forms. Also investigated are methods for representing arclength, surface area and volume elements from vector representations. The directional derivative is defined along with other vector operations and their properties as these additional vectors enable one to find maximum and minimum values associated with functions of more than one variable. The chapter 8 investigates scalar and vector fields and operations involving these quantities. The Gauss divergence theorem, the Stokes theorem and Green's theorem in the plane along with applications associated with these theorems are investigated in some detail. The chapter 9 presents applications of vectors from selected areas of science and engineering. The chapter 10 presents an introduction to the matrix calculus and the difference calculus. The chapter 11 presents an introduction to probability and statistics. The chapters 10 and 11 are presented because in todays society technology development is tending toward a digital world and students should be exposed to some of the operational calculus that is going to be needed in order to understand some of this technology. The chapter 12 is added as an after thought to introduce those interested into some more advanced areas of mathematics.

If you are a beginner in calculus, then be sure that you have had the appropriate background material of algebra and trigonometry. If you don't understand something then don't be afraid to ask your instructor a question. Go to the library and check out some other calculus books to get a presentation of the subject from a different perspective. The internet is a place where one can find numerous help aids for calculus. Also on the internet one can find many illustrations of the applications of calculus. These additional study aids will show you that there are multiple approaches to various calculus subjects and should help you with the development of your analytical and reasoning skills.

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