Hitchhiker's Guide to the Introductory Physics

Seungwoo Schin

School of Computing, KAIST

Contents

PREFACE

I. Short Recap on Mathematicla Tools

I. Calculus

I.1 Coordinates

Cartesian Coordinate

Polar Coordinate

Cylindrical Coordinate

Spherical Coordinate

I.2 Vector

Definition

Operations

- Addition, Subtraction

- Scalar Multiplication

- Inner Product

- Outer Product

I.3 Multivariable Functions

Partial Derivatives

Gradient

Maximization/Minimization

Coordinate Change and Jacobian

I.4 Functionals

I.5 Vector Fields

Definition

Curl

Divergence

I.6 Line/Surface Integral

Introduction

Fundamental Theorem of Calculus Revisited

Green's Theorem

Divergence Theorem

II. Graph Theory

III. Implementation of Network using Python

IV. Stochastic Models

IV.1 Probability and Random Variable

IV.2 Markov Chain

II. Mechanics

I. Classical Mechanics

II. Thermodynamics

III. Quantum Mechanics

III. Statistical Mechanics

I.   Classical Statistical Mechanics

II.   Quantum Statistical Mechanics

IV.   APPLICATION ON NETWORK SCIENCE