ENTER THE TITLE

ENTER THE NAME

July 14, 2025

Preface

Contents

Chapter 1

Prologue

1.1 Why Tensor Calculus?

1.1.1 Exercise 1.

Suppose that the temperature field T is given by the function $F(x, y) = x^2 e^y$ in coordinates x, y. Determine the function $F(x', y')$, which gives the temperature field T in coordinates x', y'.

sol.

$F'(x', y') = F(2x', 2y') = F(x, y) = (2x')^2 e^{2y'}$ ■

1.1.2 Exercise 2.

This is a table.

Table 1.1: Student Academic Performance - Fall 2024

Student Name	Mathematics	Physics	Chemistry	GPA
John Smith	85	92	78	3.52
Emily Johnson	94	88	91	3.78
Michael Brown	76	82	85	3.21
Sarah Davis	91	95	89	3.85
David Wilson	88	79	84	3.44
Average	86.8	87.2	85.4	3.56

1.1.3 Exercise 3.

The derivation of the Black-Scholes equation involves the use of Ito's Lemma and the concept of a risk-neutral portfolio. Consider a stock whose price $S(t)$ follows the stochastic differential equation:

$$dS = \mu S dt + \sigma S dW \tag{1.1}$$

where:

- μ is the drift rate of the stock.
- σ is the volatility of the stock.
- W is a Wiener process or Brownian motion.

Definition 1.1.1: The Formula

$$dS = \mu S dt + \sigma S dW \tag{1.2}$$

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  \item[\boxlabel{Label 2 with a very long comment}{4cm}]
        \lipsum[2]
\end{description}
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My github website

Lemma 1.1.2: This is an arbitrary lemma

$$\hat{i} \times \hat{j} = \hat{k} \tag{1.3}$$

Theorem 1.1.3: This is an arbitrary lemma

$$\lim_{x \to a} f(x) = 1 + 2x + 3x^2 + 4x^3 + 5x^4 \tag{1.4}$$

Bibliography

[1] Pavel Grinfeld. *Introduction to Tensor Analysis and the Calculus of Moving Surfaces*. Springer, 2013.

[2] B. B. Bartelle, A. Barandov, and A Jasanoff. "Molecular fMRI". In: *Journal of Neuroscience* 36 (2016), pp. 4139–4148.