

Solutions to Claire Voisin's
Hodge Theory and Complex Algebraic Geometry II

Patrick Borse

ABSTRACT. This document contains solutions to the exercises of Claire Voisin's *Hodge Theory and Complex Algebraic Geometry II*.

Contents

Part I. The Topology of Algebraic Varieties	4
Chapter 1. The Lefschetz Theorem on Hyperplane Sections	5
Chapter 2. Lefschetz Pencils	6
Chapter 3. Monodromy	7
Chapter 4. The Leray Spectral Sequence	8
Part II. Variations of Hodge Structure	9
Chapter 5. Transversality and Applications	10
Chapter 6. Hodge Filtration of Hypersurfaces	11
Chapter 7. Normal Functions and Infinitesimal Invariants	12
Chapter 8. Nori's Work	13
Part III. Algebraic Cycles	14
Chapter 9. Chow Groups	15
Chapter 10. Mumford's Theorem and its Generalisations	16
Chapter 11. The Bloch Conjecture and its Generalisations	17

Part I

The Topology of Algebraic Varieties

CHAPTER 1

The Lefschetz Theorem on Hyperplane Sections

1.1.

1.2.

CHAPTER 2

Lefschetz Pencils

2.1.

2.2.

2.3.

CHAPTER 3

Monodromy

3.1.

3.2.

CHAPTER 4

The Leray Spectral Sequence

4.1.

4.2.

Part II

Variations of Hodge Structure

CHAPTER 5

Transversality and Applications

5.1.

5.2.

CHAPTER 6

Hodge Filtration of Hypersurfaces

6.1.

6.2.

CHAPTER 7

Normal Functions and Infinitesimal Invariants

7.1.

7.2.

CHAPTER 8

Nori's Work

8.1.

Part III

Algebraic Cycles

CHAPTER 9

Chow Groups

9.1.

9.2.

CHAPTER 10

Mumford's Theorem and its Generalisations

10.1.

10.2.

CHAPTER 11

The Bloch Conjecture and its Generalisations

11.1.

11.2.