Readings for Unit I
(Topics from linear algebra)

I.0 : Background

Suggested readings.

Ryan : pp. 193 – 202

Comments.

This is Appendix **D** in Ryan's book, and it is an extremely brief and rapid summary of basic linear algebra. Some first courses in linear algebra do not cover some of the topics discussed in these pages of Ryan, most notably multilinear functions (pp. 199 – 200) and eigenvectors and eigenvalues (p. 201). Also, the discussion of complex structure on p. 196 is somewhat nonstandard. We shall not be using any of these topics explicitly or regularly in the present course. However, we should note the material on that page starting with Theorem **3D** goes off in a much different direction and should be understood thoroughly, for it involves the simplest nontrivial cases of important concepts from linear algebra.

I.1 : Dot products

Suggested readings.

Ryan : pp. 8 – 11, 14, 86 – 88

Comments.

The first passage includes the beginning of Chapter **1** up to (but not including) the subheading "Lines," the second covers "Orthonormal pairs," and the third covers the subheading, "Orthonormal bases." Once again, some courses in linear algebra do not say much about dot (or inner) products, and if they contain very little about the subject it is unlikely they introduce the concept of an orthonormal set. However, such sets will play an important role in the present course, and they are discussed explicitly in the course notes.

I.2 : Cross products

Supplementary background readings.

Ryan : pp. 84 – 88, 136 – 138

The first passage covers the beginning of Chapter **4** up to (but not including) the subheading, **"**Incidence geometry of the sphere**,"** and the second covers the subheading "Cross products**,"** which establishes further properties of this familiar operation on **3** – dimensional vectors**.** All of these topics are covered explicitly in the course notes. There will be a few instances when we shall use cross products, but we shall not use them as extensively as we shall use the dot products from the preceding section**.**

I. 3 : Linear varieties

<u>Supplementary background readings.</u>

Ryan : pp. 11 – 18

<u>Comments.</u>

This passage starts with the subheading**,** "The Euclidean plane**,"** at the top of page 11 and continues through the subheading, **"**Parallel and intersecting lines**,"** which ends at the bottom of page 18**.** Many of the ideas in this section of the notes are discussed for the special case of lines in the plane**.**

I.4 : Barycentric coordinates

<u>Supplementary background readings.</u>

Ryan : pp. 58**,** 68

<u>Comments.</u>

On page 58 there is a definition of barycentric coordinates**,** and one of the exercises on page 68 calls for a proof of one of the basic results on these numbers**;** the treatment of barycentric coordinates in the course notes is considerably more extensive**.**