

## Mathematics 235H – Linear algebra II: Vector spaces

TRENT UNIVERSITY, Winter 2008

### Assignment #1

*Due on Tuesday, 15 January, 2008.*

As will usually be the case on the assignments in MATH 235H, you may work together on this assignment and consult any sources you like in addition to the handouts and the text, so long as you write up all the work you submit entirely by yourself and give due credit to all relevant sources of help and information.

### The Island of Knights and Knaves

The inhabitants of the Island of Knights and Knaves are either knights, who always tell the truth, or knaves, who always lie. While visiting the Island you encounter ...

1. ... a fork in the road with a tourist information booth staffed by two inhabitants. A sign on the booth tells you that:
  - i.* One of the forks leads to the the Hamlet of Indeterminacy, but doesn't tell you which one.
  - ii.* One of the staffers is a knight and the other is a knave, but you only get to ask one of them a single question.

What should you ask one of the staffers to find out which fork of the road leads to the Hamlet of Indeterminacy? [3]

2. ... two inhabitants, A and B, who tell you the following.

A: Both of us are knights.  
B: One of us is a knight and the other is a knave.

Determine, if you can, whether each of A and B is a knight or a knave. [3]

3. ... seven inhabitants, A, B, C, D, E, F, and G, who tell you the following.

A: B is a knave or C is a knight.  
B: B and E are both knights or both knaves.  
C: B and F are both knights.  
D: A and C are both knaves.  
E: C is a knave.  
F: Exactly one of B and G is a knight.  
G: One of A and B is a knave and the other is a knight.

Determine, if you can, whether each of A–G is a knight or a knave. [4]

In each of **1–3**, you should provide as complete and correct a chain of reasoning as you can to justify your answer.