V63.0140-3: Linear Algebra. Homework 6

due Thurs Oct 23 at start of lecture

A1) In lecture (and review) we discussed the case where a set of three vectors may be linearly dependent and yet the third member of the set *cannot* be written as a linear combination of the first two. Write down a simple example set of three such (non-identical) vectors in $\mathbb{R}^2$. Does your set span $\mathbb{R}^2$?

A2) You are given an $m \times n$ matrix A whose columns span $\mathbb{R}^m$.

a) Explain why it must be that $n \geq m$. [Hint: pivots].

b) Explain why the relation $m + f = n$ holds, where f is the number of free variables in the solution of $A\mathbf{x} = \mathbf{0}$. This is a baby version of the *Rank Theorem* (which we will soon meet). f will become known as the 'dimension of the null space of A'.

3.2:
33.
35.
40. (keep in mind 3.1.38 from HW5).

3.3:
4.
19. (see worksheet from Lec 12, and Example 4 in the text).

4.1:
3.
8.
12.
16.
24.

4.2:
2.
3.
18. (simpler than it looks.)
22.