

## M303 Homework Assignment 7

Please do the following problems but please do **not** hand them in:

- (5.2) 1, 3, 5, 6def, 7, 8, 9, 11ab  
(5.3) 1, 2cd, 3ab, 5b, 7, 13, 16, 18, 19

Answers:

- (5.2) 7(a) yes; 7(b) yes; 7(c) no.  
(5.2) 8(a)  $(-9, -7, -15) = -2\mathbf{u} + \mathbf{v} - 2\mathbf{w}$ ; 8(b)  $(6, 11, 6) = 4\mathbf{u} - 5\mathbf{v} + \mathbf{w}$ .  
(5.3) 2(c) indep. 2(c) dep.

Please **hand in** the following problems Wednesday, October 14.

Section 5.2:

- [Anton, (5.2) 2ab.] Use Theorem 5.2.1 to determine which of the following are subspaces of  $M_{22}$ :
  - All  $2 \times 2$  matrices with integer entries.
  - All matrices  $\begin{bmatrix} a & b \\ c & d \end{bmatrix}$  where  $a + b + c + d = 0$ .
- Express the vector  $(-4, 10, 3)$  as a linear combination of  $\mathbf{u} = (1, 1, 0)$ ,  $\mathbf{v} = (2, 0, 3)$ , and  $\mathbf{w} = (3, -1, 2)$ .
- Determine whether the following polynomials span  $P_2$ :

$$\mathbf{p}_1 = 1 + x + x^2, \quad \mathbf{p}_2 = 4 + 5x + 6x^2, \quad \mathbf{p}_3 = 1 + 2x + 3x^2$$

Section 5.3:

- Let  $\mathbf{v}_1 = (1, 3, 5)$ ,  $\mathbf{v}_2 = (-2, 0, 4)$  and  $\mathbf{v}_3 = (7, 6, 0)$ .
  - Show these vectors are linearly dependent.
  - Express each vector as a linear combination of the other two.
- Which of the following sets of vectors in  $P_2$  are linearly independent?
  - $1 + x^2, \quad x + x^2, \quad 1 + x$
  - $1 + x^2, \quad x + x^2, \quad 1 - x$