# Finite Mathematics

## Homework 4

### Due in class Monday, March 9, 2020

*Note:* Assignments marked (*) are *not* for bonus credit. They will not be graded. Do not turn them in. However, they will be discussed in the tutorial and typically example solutions are available online (in case of Hefferon's book, there is a PDF with solutions available on the book's web site.)

1. *Hefferon, p. 119, Exercises 1.19
2. *Hefferon, p. 119, Exercises 1.21
3. Determine whether the members of the given set of vectors are linearly independent. If they are linearly dependent, find a linear relation among them.

   (a) $\boldsymbol{v}_1 = \begin{pmatrix} 1 \\ 1 \\ 0 \end{pmatrix}, \quad \boldsymbol{v}_2 = \begin{pmatrix} 0 \\ 1 \\ 1 \end{pmatrix}, \quad \boldsymbol{v}_3 = \begin{pmatrix} 1 \\ 0 \\ 1 \end{pmatrix}$

   (b) $\boldsymbol{v}_1 = \begin{pmatrix} 1 \\ 2 \\ -2 \end{pmatrix}, \quad \boldsymbol{v}_2 = \begin{pmatrix} 3 \\ 1 \\ 0 \end{pmatrix}, \quad \boldsymbol{v}_3 = \begin{pmatrix} 2 \\ -1 \\ 1 \end{pmatrix}, \quad \boldsymbol{v}_4 = \begin{pmatrix} 4 \\ 3 \\ -2 \end{pmatrix}$

   (2+2)
4. *VMLS, p. 64, Exercise 3.4
5. VMLS, p. 64, Exercise 3.9 (2)
6. Compute $\|\boldsymbol{x}\|$, $\text{rms}(\boldsymbol{x})$ and $\text{avg}(\boldsymbol{x})$ for the 16-vector $\boldsymbol{x}$ which has $x_1 = x_2 = x_3 = 2$ and $x_4 = \cdots = x_{16} = 1$. (2)
7. (Cf. VMLS, Exercise 3.16.) Suppose $\boldsymbol{x}$ is an $n$-vector and $\alpha$ and $\beta$ are scalars. Show that

   (a) $\text{avg}(\alpha\boldsymbol{x} + \beta) = \alpha\,\text{avg}(\boldsymbol{x}) + \beta$,

   (b) $\text{std}(\alpha\boldsymbol{x} + \beta) = |\alpha|\,\text{std}(\boldsymbol{x})$.

   (2)