Homework 1–21-241 Lec 3, Matrices and Linear Transformations

Spring 2017

Name: _____
Section: _____

Instructions: Complete the following problems. Staple this sheet, with your name and section filled in, to the top of your work. Failure to attach this sheet will result in a three-point deduction in the grade. The assignment will be graded out of fifty points.

DUE: BEGINNING OF CLASS, FRIDAY, JANUARY 27

Book Problems

1. Section 1.1: 2, 8, 12, 14, 16, 24
2. Section 1.2: 2, 8, 14, 17, 22, 24, 26, 30, 38, 42, 52
3. Section 1.3: 6, 10, 14, 28
4. Section 1.4: 4

Other Problems

1. Let
$$\mathbf{u} = \begin{bmatrix} 2 \\ 1 \\ 1 \\ -1 \end{bmatrix}, \mathbf{v} = \begin{bmatrix} 3 \\ 1 \\ 2 \\ 0 \end{bmatrix}.$$
   (a) Using MATLAB, calculate $-5\mathbf{u} + 2.5\mathbf{v}$.

(b) Using MATLAB, calculate $\mathbf{u} \cdot \mathbf{v}$, $\|\mathbf{u}\|$, and $\|\mathbf{v}\|$. Verify that the Cauchy-Schwarz Inequality holds.

Hint: Look at Appendix E for your textbook online. Attach a printout of your work in MATLAB.

2. Let $\mathbf{u}$, $\mathbf{v}$, and $\mathbf{w}$ be in $\mathbb{R}^n$. Show that if $\mathbf{u}$ is orthogonal to $\mathbf{v}$ and to $\mathbf{w}$, then $\mathbf{u}$ is orthogonal to any linear combination of $\mathbf{v}$ and $\mathbf{w}$.