Name _____

Mathematics 1553

Written Homework 2

Prof. Margalit

Section: H / J (circle one)

Subsection: left / center / right (circle one)

29 January 2016

1. Let A be a 3×2 matrix and let

$$v = \begin{pmatrix} -1 \\ 4 \end{pmatrix}, \quad b = \begin{pmatrix} 2 \\ -1 \\ 3 \end{pmatrix}, \text{ and } \quad c = \begin{pmatrix} 10 \\ -5 \\ 15 \end{pmatrix}.$$

If Av is equal to c, is it true that the matrix equation $Ax = b$ is consistent? Answer *yes/no/maybe* and explain your answer.

2. Suppose we have a collection of objects in $\mathbb{R}^n$ located at the points $v_1, \ldots, v_k$ and having masses $m_1, \ldots, m_k$. The *center of mass* of the collection of objects is:

$$\frac{m_1 v_1 + \cdots + m_k v_k}{m_1 + \cdots + m_k}$$

Find the center of mass of the collection of objects that all weigh 1 gram and are located at the points $(0, 1)$, $(8, 1)$, and $(2, 4)$ in $\mathbb{R}^2$.

Determine how to distribute an additional mass of 6 grams at the three points $(0, 1)$, $(8, 1)$, and $(2, 4)$ so that the center of mass moves to $(2, 2)$. *Hint: Add masses w_1, w_2, w_3 to the three points so that $w_1 + w_2 + w_3 = 6$.*