CS416 Spring 2007
Prof. Wright

Assignment #5

Due March 9, 2007

1. Problem 9.2.40 (p. 417)

2. Consider the vector space $\mathbb{R}^3$ (with the usual definition of vector addition and scalar multiplication). Say whether the following are subspaces of this vector space:

   (a) The set $S = \left\{ \begin{bmatrix} 0 \\ v_2 \\ v_2 \end{bmatrix} \mid v_2 \in \mathbb{R} \right\}$.

   (b) The set $S = \left\{ \begin{bmatrix} v_1 \\ v_2 \\ 1 \end{bmatrix} \mid v_1, v_2 \in \mathbb{R} \right\}$.

   (c) The set $S = \{v \in \mathbb{R}^3 \mid \|v\|_2 \leq 1\}$, where the Euclidean norm $\|v\|_2$ is defined as $\sqrt{v_1^2 + v_2^2 + v_3^2}$.

3. Are the following matrices positive semidefinite? Positive definite?

   (a) $A = \begin{bmatrix} 1 & 2 \\ 2 & 2 \end{bmatrix}$.

   (b) $A = \begin{bmatrix} 1 & 0 & 0 \\ 0 & -2 & 0 \\ 0 & 0 & 1 \end{bmatrix}$.

   (c) $A = \begin{bmatrix} 3 & -1 \\ 0 & 2 \end{bmatrix}$.