Matrix Algebra
Basis
Homework 10

1. Explain why each of the following sets is not a basis for $\mathbb{R}^2$.
   a) $\{(1,2)^T, (1,0)^T, (0,1)^T\}$
   b) $\{(6,-5)^T, (-12,10)^T\}$
   c) $\{(-3,2)^T\}$
2. Explain why each of the following sets is not a basis for $\mathbb{R}^3$.
   a) $\{(1,2,0)^T, (-1,0,2)^T, (0,2,2)^T\}$
   b) $\{(-6,4,-5)^T, (2,1,0)^T\}$
   c) $\{(3,2,1)^T, (1,2,3)^T, (2,3,1)^T, (3,1,2)^T\}$
3. For each of the following, determine whether or not the given set S is a basis for the corresponding $\mathbb{R}^n$.
   a) $S = \{(3,2)^T, (2,3)^T\}$ for $\mathbb{R}^2$.
      Answer: It is a basis.
   b) $S = \{0,3,2)^T, (4,0,3)^T, (-8,15,-16)^T\}$ for $\mathbb{R}^3$.
      Answer: It is a basis.
   c) $S = \{(0,0,0)^T, (1,5,6)^T, (6,2,1)^T\}$ for $\mathbb{R}^3$
      Answer: It is not a basis.
   d) $S = \{(0,0,0)^T, (1,5,6)^T, (6,2,1)^T, (1,1,1)^T\}$ for $\mathbb{R}^3$
      Answer: It is not a basis.
   e) $S = \{(1,2,0,1)^T, (0,1,0,0)^T, (1,0,0,0)^T, (0,0,2,0)^T\}$ for $\mathbb{R}^4$.
      Answer: It is a basis.