HW #5 Even Solutions

4.3) 22) a) False; \{ (0), (0) \} \subseteq IR^3 is l.i., but not a basis
   b) True by Thm
   c) True
   d) False; see top p. 229
   e) False; consider \((1, 2) \sim (1, 2, 0, 0)\).

4.5) 20) a) True; def. of subspace, viewing IR^2 as \{(x, y, 0, 0)\}
   b) False; \((0, 1), (x, 2) = 0\) has 2 vars
   c) False; \(IR^3\) is spanned by \(\{(x) | x \in IR^3\}\)

4) False
   \(\{(0), (0), (1)\} \subseteq IR^2\)
   e) True
4.6) 8) \( \text{dim Null } A = 2 \)
\( \text{Col } A \) is not \( \mathbb{R}^4 \) but a
4-dimensional subspace of \( \mathbb{R}^5 \).

18) a) False; \((1 \ 2) \sim (1 \ 2)\)
6) True
3) True
2) True
1) True; Thm 13

20) No, via the given we see that
\( \text{dim Null } A = 2 \) hence,
\[ \text{dim Col } A = 6 = 8 - 2 \]
where \( A \) is the \( 6 \times 8 \)
matrix associated the given system.
Since \( \text{Col } A \subseteq \mathbb{R}^6 \) we see \( \text{Col } A = \mathbb{R}^6 \)
\( Ax = b \) has a sol \( \forall b \in \mathbb{R}^6 \).

22) \( \text{Associated to such an system is} \)
a \( 10 \times 12 \) matrix \( A \). The assumption
would give \( \text{dim Null } A = 1 \), hence
\[ \text{dim Col } A = 12 - 1 = 11. \] But \( \text{Col } A \subseteq \mathbb{R}^{10} \) which has
1 dimension 10.
24) Yes & no. The first part is easy. 
Associated to such a system is a $7 \times 6$ matrix $A$. Note $\text{Rank}(A) \leq 6$, hence 
exists $b \in \mathbb{R}^7$ s.t. $Ax = b$ is inconsistent.