

Answer key for the December 2005, Math 1300 final exam:

1. A: 4 equations, 2 variables, unique solution
B: 4 equations, 4 variables, infinitely solutions, 2 parameters
C: 3 equations, 4 variables, no solutions

2. Determinant equals 8.

$$3. \text{ a) } -4, \text{ b) } 2, \text{ c) } -1, \text{ d) } A^{-1} = \begin{bmatrix} 1 & 0 & 0 \\ 0 & -1 & 0 \\ 0 & -2 & 1 \end{bmatrix}.$$

$$4. z = -6$$

$$5. E_1 = \begin{bmatrix} 1 & 0 & 0 \\ 1 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}, \quad E_2 = \begin{bmatrix} 1 & 0 & 0 \\ 0 & 0 & 1 \\ 0 & 1 & 0 \end{bmatrix}.$$

$$6. \text{ a) } (1, -1, -1), \text{ b) } \sqrt{6}, \text{ c) } 2, \text{ d) } \left(\frac{2}{\sqrt{5}}, \frac{-1}{\sqrt{5}}, 0\right) \text{ and } \left(\frac{-2}{\sqrt{5}}, \frac{1}{\sqrt{5}}, 0\right), \text{ e) all } \mathbf{x} \text{ with } 2a - b = 0.$$

$$7. \text{ a) point } (2, -1, 0), \text{ b) } (2, -3, -2), \text{ c) } 2x - 3y - 2z - 7 = 0.$$

$$8. \text{ a) } W \text{ is a subspace, b) Basis: } \left\{ \begin{bmatrix} 0 & 1 \\ 0 & 0 \end{bmatrix}, \begin{bmatrix} 0 & 0 \\ 0 & 1 \end{bmatrix} \right\}.$$

$$9. \text{ a) Yes, b) No: spanning set for } \mathbb{R}^4 \text{ must have at least 4 vectors.}$$

$$10. \text{ a) i. } 3, \text{ ii. } 3, \text{ iii. } 3, \text{ iv. } 4, \text{ v. } 7, \quad \text{b) } \{(1, -1, 0, -2, 0, 3), (0, 0, 1, 2, 5, -1)\}, \\ \text{c) } \{(-2, 1, 0, 0, 0), (-3, 0, 1, 0, 0), (2, 0, 0, -3, 1)\}.$$