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 parameteers
   C: 3 equations, 4 variables, no solutions

2. Determinant equals 8.

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

4. $z = -6$

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

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

7. a) point (2, –1, 0), b) (2, -3, -2), c) $2x - 3y - 2z - 7 = 0$.

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

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

10. a) i. 3, ii. 3, ii. 3, iv. 4, v. 7, b) { (1, –1, 0, –2, 0, 3), (0, 0, 1, 2, 5, –1)},
    c) { (–2, 1, 0, 0, 0), (–3, 0, 1, 0, 0), (2, 0, 0, –3, 1) }.