Answer key for MATH1300 final exam, April 2008

1. a) b=1, a not equal to 2  b) b not equal to 1  c) b=1, a=2.

2. a) 9  b) $A^{-1}= \frac{1}{9}\begin{bmatrix} 3 & 7 & 0 & 2 \\ -3 & 5 & 9 & 4 \\ 0 & 9 & 0 & 0 \\ 3 & 0 & -2 & -3 \end{bmatrix}$  c) $x_1=25/9$, $x_2=14/9$, $x_3=2$, $x_4=1/9$.

3. a) true, b) false, c) true, d) true, e) false, f) false.

4. a) $\frac{-1}{7}$, b) $\sqrt{20}$, c) 32.

5. a) 2x–2y+z–3=0, b) x=2/3, y=–5/3, z=–5/3

   c) dot product of (5, 3, –4) and (2, –2, 1) is 0.

6. a) $\frac{1}{\sqrt{27}}(4, 1, -1, 3)$  b) $k_1 = \frac{3}{\sqrt{17}}, k_2 = \frac{-3}{\sqrt{17}}$  c) t= –4/3.

7. a) 4
   b) {(-2, 1, 0, 0, 0, 0, 0), (–1, 0, –4, 1, 0, 0, 0), (0, 0, 0, 0, –6, 1, 0),(0, 0, 0, 0, –7, 0, 1)}
   c) 3  d) {(1, 2, 0, 4, 0, 0, 0), (0, 0, 1, 4, 0, 0, 0), (0, 0, 0, 0, 1, 6, 7)}  e) 3
   f) { (1, 1, 0, 0, ), (0, 1, 1, 0), (0, 2, 0, 1)}.

8. a) can not span  b) linearly dependent  c) linearly dependent.

9. a) no  b) no  c) yes.

10. a) yes  b) no  c) dimension 2, basis {(1, 2, 0, 3), (0, 1, 2, 1)}.