HW01

MATH 102, WINTER 2018

DUE WEDNESDAY, JAN 17

NAME:

1. Recall that a system of linear equations is *singular* if it has none or infinitely many solutions. Explain why the system

$$\begin{array}{ccccccc} u & + & v & + & w & = & 2 \\ u & + & 2v & + & 3w & = & 1 \\ & & v & + & 2w & = & 0 \end{array}$$

   is singular by finding a combination of the three equations that adds up to $0 = 1$. What value should replace the last zero on the right side to allow the equations to have solutions–and what is one of the solutions?

2. Prove that it is impossible for a system of linear equations to have exactly two solutions.

3. Which number d forces a row exchange, and what is the triangular system (not singular) for that d? Which d makes this system singular (no third pivot)?

$$\begin{array}{ccccccc} 2x & + & 5y & + & z & = & 0 \\ 4x & + & dy & + & z & = & 2 \\ & & y & - & z & = & 3. \end{array}$$

4. Write these ancient problems in a 2 by 2 matrix form $A\boldsymbol{x} = \boldsymbol{b}$ and solve them:

   a) X is twice as old as Y and their ages add to 39,

   b) $(x, y) = (2, 5)$ and $(3, 7)$ lie on the line $y = mx + c$. Find m and c.