Problem 1                                                                                            (5 pts)

Given the system of equations $A\underline{x} = \underline{b}$,

| x | + | y | + | z | = | 0 |

| 2x | | | + | z | = | 1 |

| | | 2y | + | z | = | -1 |

| x | - | y | - | z | = | 2 |

Find the Echelon form of ( $A|\underline{b}$ ) and choose the correct answer from the choices below.

    a)  The system of equations are inconsistent
    b)  The system of equations are consistent with a unique solution  x=1, y=1, z=1
    c)  The system of equations are consistent with an infinite number of solutions
    d)  The system of equations are consistent with a unique solution x=1, y=0, z=-1

$$(A|\underline{b}) = \begin{bmatrix} 1 & 1 & 1 & 0 \\ 2 & 0 & 1 & 1 \\ 0 & 2 & 1 & -1 \\ 1 & -1 & -1 & 2 \end{bmatrix} \sim \begin{bmatrix} 1 & 1 & 1 & 0 \\ 0 & -2 & -1 & 1 \\ 0 & 2 & 1 & -1 \\ 0 & -2 & -2 & 2 \end{bmatrix}$$ Divide last row by -2 and swap with 2nd row

$$\sim \begin{bmatrix} 1 & 1 & 1 & 0 \\ 0 & 1 & 1 & -1 \\ 0 & 2 & 1 & -1 \\ 0 & -2 & -1 & 1 \end{bmatrix} \sim \begin{bmatrix} 1 & 1 & 1 & 0 \\ 0 & 1 & 1 & -1 \\ 0 & 0 & -1 & 1 \\ 0 & 0 & 1 & -1 \end{bmatrix} \sim \begin{bmatrix} 1 & 1 & 1 & 0 \\ 0 & 1 & 1 & -1 \\ 0 & 0 & 1 & -1 \\ 0 & 0 & 1 & -1 \end{bmatrix} \sim \begin{bmatrix} 1 & 1 & 1 & 0 \\ 0 & 1 & 1 & -1 \\ 0 & 0 & 1 & -1 \\ 0 & 0 & 0 & 0 \end{bmatrix}$$

The equations are consistent with a unique solution.  The solution is found from

$z = -1$

$y + z = -1 \qquad \Rightarrow \qquad y - 1 = -1 \qquad \Rightarrow \qquad y = 0$

$x + y + z = 0 \qquad \Rightarrow \qquad x + 0 - 1 = 0 \qquad \Rightarrow \qquad x = 1$

Problem 2                                                                                                      (5 pts)

Consider the Matlab script file

```
A=[1 2; 3 4]
for i=1:3
    A=2*A
    if A(1,1)==8
        x=1
    else
        x=0
    end
end
```

Running the script file results in

a)   an error message
b)   x=0
c)   x=1
d)   x=2
e)   x=3
f)    none of the above

A =

   1   2
   3   4

A =

   2   4

   6   8

x =   0

A =

   4   8

   12   16

x =   0

A =

   8   16

   24   32

x =   1