Homework Assignment #10: Mathematical Fundamentals (2)

Your name: _____

1. (8%) Determine a basis and the dimension of the subspace S in V_4 over Z_2 consisting of vectors:

(0 0 0 0), (1 0 1 1), (1 0 0 1), (0 0 1 0), (0 1 1 0), (1 1 0 1), (1 1 1 1), (0 1 0 0)

2. (6%) Given the following matrix over Z_2:

$$G = \begin{pmatrix} 1 & 0 & 1 & 1 \\ 0 & 1 & 1 & 0 \\ 1 & 1 & 0 & 1 \end{pmatrix}$$

(1) List all different vectors in the row space of matrix G.
(2) What is the row rank of matrix G

3. (4%) The following simultaneous linear equations

$$2x_1 + x_2 + 3x_3 = 1$$
$$x_1 + 3x_2 + 4x_3 = 2$$
$$3x_1 + 4x_2 + x_1 = 3$$

can be equivalently represented in a matrix format

$$AX = B$$

Then, what are the contents of A, X, and B?