Your name:

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Math 22 Fall 2016, Homework 1, due Wed Sep 21
Please show your work, and check your answers. No credit is given for solutions without work or justification.

(1) Given the system of equations, answer the following questions.

$$\begin{aligned}
x_2 + 2x_3 &= -1 \\
2x_1 - x_2 &= 3 \\
x_1 + x_2 + 3x_3 &= 0
\end{aligned}$$

(a) Write the augmented matrix and transform it to reduced echelon form:

(b) Write the *general* solution to the linear system (by any non-computer method), if there is one:

(2) For what value(s) of h is the vector $\begin{bmatrix} 1 \\ 0 \\ h \end{bmatrix}$ in Span$\left\{ \begin{bmatrix} 8 \\ 0 \\ -4 \end{bmatrix}, \begin{bmatrix} -2 \\ 1 \\ 1 \end{bmatrix}, \begin{bmatrix} 4 \\ 2 \\ -2 \end{bmatrix} \right\}$?

For the value(s) of h when the vector is in the span, is the set of weights in the linear combination which produces the vector unique? Explain.

(3) True or false (no working needed, just circle the answer):

(a) T / F: A linear system with less equations than unknowns can have a unique solution.

(b) T / F: A linear system with less equations than unknowns can be consistent.

(c) T / F: If $\mathbf{u} = (1,0)$ and $\mathbf{v} = (0,1)$ then Span$\{\mathbf{u},\mathbf{v}\}$ is the set of points that are either in Span$\{\mathbf{u}\}$ or in Span$\{\mathbf{v}\}$.

(d) T / F: If an augmented matrix has a row $[0\ 0\ 0\ 7\ 0]$ then it cannot be consistent.

(e) T / F: It can happen that the span of three vectors in $\mathbb{R}^3$ is a line.

(f) T / F: By using different sequences of elementary row operations, a matrix can be transformed into two different reduced echelon forms.

(g) T / F: The matrix $\begin{bmatrix} 0 & 1 & 0 & 1 \\ 0 & 0 & 0 & 1 \end{bmatrix}$ is in reduced echelon form.