a) Discuss the consistency of the following system of the equation:

$$3x_1 - 0.1x_2 - 0.2x_3 = 7.85$$

$$0.1x_1 + 7x_2 - 0.3x_3 = -19.3$$

$$0.3x_1 - 0.2x_2 + 10x_3 = 71.4$$

If found consistent, solve it by Gauss elimination method.

b) Verify that $Au.v = u.A^T v$

Suppose that $A = \begin{bmatrix} 1 & -2 & 3 \\ 2 & 4 & 1 \\ -1 & 0 & 1 \end{bmatrix}$ $u = \begin{bmatrix} -1 \\ 2 \\ 4 \end{bmatrix}$ $v = \begin{bmatrix} -2 \\ 0 \\ 5 \end{bmatrix}$

a) Let $u = (2, 2, -4)$ and $v = (a, 1, -1)$ for what value of a is u and v are orthogonal?

b) Show that the system of equations below is consistent if $C = 2a - 3b$.

$$2x - y + 3z = a$$
$$3x + y - 5z = b$$
$$-5x - 5y + 21z = c$$

a) Find a linear combination $V_1 = (1, 2, 3), V_2 = (0, 1, 2) and V_3 = (-1, 0, 1)$

   i.   prove that $W = (1, 1, 1)$ is a linear combination of V_1, V_2, V_3.

   ii. prove that $W = (1, -2, 2)$ is not a linear combination of V_1, V_2, V_3.

b) Determine whether $V_1 = \begin{bmatrix} 1 \\ 1 \\ 2 \end{bmatrix}, V_2 = \begin{bmatrix} 1 \\ 0 \\ 1 \end{bmatrix} and V_3 = \begin{bmatrix} 2 \\ 1 \\ 3 \end{bmatrix}$ Span the vector space R^3.

c) Find the Rank of the given system. Define the consistency criteria of the system (which type of solution).

$$2x + 6y = -11$$
$$6x + 20y - 6z = -3$$
$$6y - 18z = -1$$