Quiz 6 Class 20

Linear Algebra I Section:

NAME & ID(Please print legibly) Week 7

PLEASE SHOW ALL YOUR WORK.

1. Let
$$b_1 = \begin{bmatrix} 1 \\ 1 \\ 0 \end{bmatrix}, b_2 = \begin{bmatrix} 1 \\ 0 \\ 1 \end{bmatrix}, b_3 = \begin{bmatrix} 0 \\ 1 \\ 1 \end{bmatrix}$$
and let T be the linear transformation from $\mathbb{R}^2$ into $\mathbb{R}^3$ defined by
$$T\left(\begin{bmatrix} x_1 \\ x_2 \end{bmatrix}\right) = x_1 b_1 + x_2 b_2 + (x_1 + x_2) b_3$$
Find the matrix A representing T with respect to the ordered bases $\{e_1, e_2\}$ and $\{b_1, b_2, b_3\}$. Here e_1, e_2 are the coordinate vectors for $\mathbb{R}^2$.

2. In this problem, the input space V contains all 2 by 2 matrices M. Suppose
$$A = \begin{bmatrix} 1 & 2 \\ 3 & 6 \end{bmatrix}.$$
Show that the identity matrix I is not in the range of T. Find a nonzero matrix M such that $T(M) = AM$ is zero.