Question 1

1. Answer the following questions.

   (a) Do elementary row operations affect a matrix's column space? Justify your response.

   (b) Do elementary row operations affect a matrix's null space? Justify your response.

a) Yes They do. Consider a matrix with more than 1 Row and 1 column. We if The Second Row is nonzero, Then The Span of The column space of matrix exists in R^n $n > 1$. But ERO can Reduce elements in Subsequent columns down to 1 and eliminate all other Rows to zero making The first Row only non-zero. This makes col space span R^1, changing it.

B) No. The matrices Nullspace is The Set of vectors where $A\vec{x} = \vec{0}$. Consider matrix A and its $RREF(A) = B$. Since A and B are Row-equivalent, meaning $\exists$ a set of EROs to turn $B \rightleftarrows A$, Then $A\vec{x} = \vec{0}$ also means $B\vec{x} = 0$. as Such, The EROs maintain The Relationship Between Rows and The nullspace is unchanged.

$$A\vec{x} = 0 \quad \& \quad B\vec{x} = 0$$