1. Assume the following assertions are true:

There are courses at Berkeley.
In every Berkeley course, there is a student who understands everything.

Circle each of the following assertions which must also then be true:

a. There is a Berkeley course in which all students understand something.
b. There is a Berkeley course in which all students understand nothing.
c. There is no Berkeley course in which each student understands nothing.
d. There is no Berkeley course in which each student does not understand something.
e. There is a Berkeley course in which there is a student who understands everything.

c, d, and e must be true.

2. For what numbers $a, b, c$ is the following matrix in row echelon form (REF) or reduced row echelon form (RREF)?

\[
\begin{bmatrix}
0 & a & 1 & b & 0 \\
0 & 0 & 0 & c & 0 \\
0 & 0 & 0 & 0 & a
\end{bmatrix}
\]

REF: $a = 0$ and any $b, c$; or $a, c \neq 0$ and any $b$.

RREF: $a, c = 1$ and $b = 0$; or $a = 0, b = 0, c = 1$; or $a, c = 0$ and any $b$. 