1. Suppose an economy has three producing sectors: agriculture, meats, and processed foods. The open sector consists of people who just consume (“eat”) all these foods. The four sectors are thus $A$, $M$, $P$ and $E$, respectively. Suppose to produce one unit of output, $A$ requires 0.22 units of its own output, and 0.13 units of $M$ and 0.1 units of $P$. Making one unit of $M$ requires 0.19, 0.11, and 0.08 units of $A$, $M$, and $P$, resp., and a unit of $P$ consumes 0.1, 0.07 and 0.3 units of $A$, $M$, and $P$, resp. The final demand by the $E$ sector is 40, 30, and 80 units of $A$, $M$, and $P$, resp.

1A. Find the consumption matrix $C$.

1B. Find $I - C$ and write it here; store it as $[B]$ in your calculator.

1C. Use your calculator to find $(I - C)^{-1}$ and write it here. (Just use $[B]$ and the “$x^{-1}$” key)

1D. Let $d$ be the final demand vector. In terms of $C$ and $d$, what is the equation which we set up to find the production vector $x$?

1E. Find the production vector $x$. (Hint: put the final demand vector $d$ into your calculator as a matrix (say $[D]$) and do an appropriate matrix multiplication.

1F. BONUS! It turns out that $(I + C + C^2 + C^3 + C^4 + C^5)d$ is $\begin{bmatrix} 81.154 \\ 55.618 \\ 131.592 \end{bmatrix}$. What is the connection between this fact and your work in (1A-1E)?
2. Let \( A = \begin{bmatrix} 5 & 6 & -6 \\ 3 & 8 & -6 \\ 3 & 6 & -4 \end{bmatrix} \).

2A. It’s a fact that \( \begin{bmatrix} 1 \\ 1 \\ 1 \end{bmatrix} \) is an eigenvector of \( A \). What is the corresponding eigenvalue? (An easy calculation)

2B. It’s also true that \( \lambda = 2 \) is an eigenvalue of \( A \). If possible, find matrices \( P \) and \( D \) that show \( A \) is diagonalizable, or explain why \( A \) is not diagonalizable. Show all your work.