ASSIGNMENT 2

Let

$$A = \begin{pmatrix} 4 & 0 & 5 \\ 3 & 1 & 6 \\ 2 & 0 & 7 \end{pmatrix}.$$

(a) Find A^{-1}.
(*You can use any method you know to find this inverse, for example, Gaussian elimination, or any other you may have learned in a Linear Algebra class.*)

(b) Find the eigenvalues and eigenvectors of A.

(c) Diagonalize A. That is, find matrices P and D such that $A = PDP^{-1}$.
(*You need not compute P^{-1}, it is straightforward, but the fractions get a bit ugly*).

(d) Use the diagonalization from part (b) to find A^{10}.
(*Your solutions may be left in terms of P and P^{-1}, since we did not compute explicitly P^{-1}, but not in terms of D. Hint: use $A = PDP^{-1}$ and then cancelations between P and P^{-1}.*)

(e) Find a (possibly complex-valued) matrix C such that $C^2 = A$.
(*Use hints from the previous part.*)

(f) Calculate the conjugate transpose of

$$\begin{pmatrix} 1 & i & 1 \\ 0 & 1 & 0 \\ i & 1 & -i \end{pmatrix}.$$