The rules for this quiz are as follows:

- **Write your name in the upper-right hand corner of the quiz.**
- This quiz will last for 10 minutes.
- Show **ALL** work for partial/full credit. This includes any definitions, mathematics, figures, etc.
- No collaboration of any kind is allowed on the quiz.
- The quiz is closed book and closed notes.
- Calculators are allowed on the quiz provided they are only used for basic computations.

1. (10 points)

   (a) (3 points) Draw diagrams with zeros and nonzeros to illustrate the order that the nonzero entries are annihilated when computing the QR factorization using Givens rotations for the following matrix:
   \[
   \begin{pmatrix}
   \times & \times \\
   \times & \times \\
   \times & \times 
   \end{pmatrix}
   \].

   (b) (7 points) Determine the Givens rotation \( G \) needed to transform the vector \( a = \begin{pmatrix} 3 \\ 4 \\ 5 \end{pmatrix} \) into a vector of the form \( b = \begin{pmatrix} \alpha \\ 4 \\ 0 \end{pmatrix} \), where \( \alpha \in \mathbb{R} \). Then show the result of applying the transformation \( G \) to \( a \).