MAT 150A, Fall 2023
Homework 6
Due before 2:10 on Wednesday, November 15

Please write the homework solutions in connected sentences and explain your work. Mark the answers to each question. Scan or take pictures of your homework and upload it to Gradescope before due time.

1. Are the following matrices orthogonal? If they are, describe them geometrically.

(a) $\begin{pmatrix} 1 & 1 \\ 1 & 1 \end{pmatrix}$ (b) $\begin{pmatrix} \frac{\sqrt{3}}{2} & \frac{1}{2} \\ \frac{1}{2} & -\frac{\sqrt{3}}{2} \end{pmatrix}$

2. Find all diagonal 3×3 matrices

$$A = \begin{pmatrix} a & 0 & 0 \\ 0 & b & 0 \\ 0 & 0 & c \end{pmatrix}$$

which are orthogonal.

Recall that an orthogonal matrix A is called **orientation reversing** if $\det(A) = -1$ and **orientation preserving** if $\det(A) = 1$.

3. Find all 2×2 orientation reversing matrices of finite order.

4. Find all 2×2 orientation preserving matrices of finite order.