1. Answer the following questions about $A \in \mathbb{R}^{3\times 3}$ below.

$$A = \begin{pmatrix} 3 & 3 & 3 \\ 6 & 2 & 3 \\ 3 & 2 & 2 \end{pmatrix}.$$

(a) Calculate the determinant of A by reducing it to upper triangular form. *[4 points]*

(b) Calculate $\left|3A^{\mathrm{T}}\right|$. *[2 points]*

(c) Calculate $\left|A^{-1}\right| = \det\left(A^{-1}\right)$. *[2 points]*

(d) Calculate the determinant of matrix below. *[2 points]*

$$\begin{pmatrix} 0 & 0 & 1 & 0 \\ 3 & 3 & 0 & 3 \\ 6 & 2 & 0 & 3 \\ 3 & 2 & 0 & 2 \end{pmatrix}.$$