

18.02 Recitation
Problems
14 September 2011

1. Compute:

$$\det \begin{pmatrix} 1 & 3 \\ -2 & 5 \end{pmatrix}, \quad \det \begin{pmatrix} -1 & -2 \\ 1 & -5 \end{pmatrix}$$

2. Compute:

$$\det \begin{pmatrix} 3 & 1 & 8 \\ 2 & 5 & -4 \\ 1 & -2 & -3 \end{pmatrix}, \quad \det \begin{pmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 7 & 8 & 9 \end{pmatrix}$$

3. (1D-1) Compute the cross products $\langle 1, -2, 1 \rangle \times \langle 2, -1, -1 \rangle$ and $\langle 2, 0, -3 \rangle \times \langle 1, 1, -1 \rangle$.
4. What is the volume of the parallelepiped with vertices at $\langle 0, 0, 1 \rangle$, $\langle a_1, a_2, 0 \rangle$, $\langle b_1, b_2, 0 \rangle$? Is this consistent with our formula for the area of a triangle?
5. Consider the matrix $M = \begin{pmatrix} 1 & 1 \\ 0 & -1 \end{pmatrix}$. What is M applied to $\begin{pmatrix} x \\ y \end{pmatrix}$? Can you interpret this transformation geometrically?
6. What is the inverse of the matrix M above?
7. Compute the product

$$\begin{pmatrix} 1 & 2 \\ -2 & 2 \\ 4 & 5 \end{pmatrix} \begin{pmatrix} -3 & -3 \\ -1 & 2 \end{pmatrix}$$

What are the dimensions of the product matrix?