

WORKSHEET 10/27/22
MATH 2331, FALL 2022

- (1) Knowing nothing else, should you expect points (x_1, y_1) , (x_2, y_2) , and (x_3, y_3) to lie on a line?
- (2) Do the points $(1, 1)$, $(2, 3)$, and $(3, 4)$ lie on a line?
- (3) Thinking about the columns of the 2×2 matrix A , why does $\det(A)$ determine whether A is invertible?
- (4) The *cross product* of the vectors \vec{v} and \vec{w} in \mathbb{R}^3 is the vector

$$\vec{v} \times \vec{w} = \begin{bmatrix} v_2 w_3 - v_3 w_2 \\ v_3 w_1 - v_1 w_3 \\ v_1 w_2 - v_2 w_1 \end{bmatrix}.$$

Show that $\vec{v} \times \vec{w}$ is orthogonal to \vec{v} and to \vec{w} .

- (5) Calculate the determinant of the matrix

$$A = \begin{bmatrix} 0 & 2 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 8 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 2 \\ 3 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 5 & 0 \\ 0 & 0 & 1 & 0 & 0 & 0 \end{bmatrix}$$