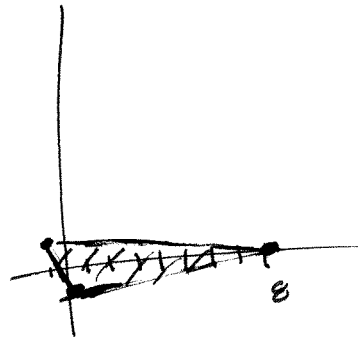


Ex 4.1
2

Find the area of the triangle with vertices at $(-1, 1)$, $(0, -1)$, $(8, 0)$.

we apply Thm 4.1.1

$$\text{Area} = \frac{1}{2} \text{abs} \begin{vmatrix} -1 & 0 & 8 \\ 1 & -1 & 0 \\ 1 & 1 & 1 \end{vmatrix}$$



$$= \frac{1}{2} \text{abs} \left(\begin{vmatrix} 0 & 8 \\ -1 & 0 \end{vmatrix} - \begin{vmatrix} -1 & 8 \\ 1 & 0 \end{vmatrix} + \begin{vmatrix} -1 & 0 \\ 1 & -1 \end{vmatrix} \right)$$

$$= \frac{1}{2} \text{abs}(8 + 8 + 1) = \frac{17}{2} \text{ square units.}$$

So, the area we seek is $\frac{17}{2}$ square units.

Ex 4.1

4a

Find the point of intersection of the lines $[2 \ -1 \ 5]$ and $[-3 \ 2 \ 1]$.

we apply Thm 4.1.3 and consider the matrix equation

$$\begin{vmatrix} 2 & -1 & 5 \\ -3 & 2 & 1 \\ a & b & c \end{vmatrix} = 0.$$

we expand and simplify

$$a \begin{vmatrix} -1 & 5 \\ 2 & 1 \end{vmatrix} - b \begin{vmatrix} 2 & 5 \\ -3 & 1 \end{vmatrix} + c \begin{vmatrix} 2 & -1 \\ -3 & 2 \end{vmatrix} = 0$$

$$-11a - 17b + 1c = 0$$

$$\text{or } [a \ b \ c] \begin{bmatrix} -11 \\ -17 \\ 1 \end{bmatrix} = 0$$

So by Thm 4.1.3, the point of intersection of our two lines is $\begin{bmatrix} -11 \\ -17 \\ 1 \end{bmatrix}$.