

12.4, number 35: **Find the area of the parallelogram with vertices**
 $A = (1, 0)$, $B = (0, 1)$, $C = (-1, 0)$, **and** $D = (0, -1)$.

Answer:

We drew a picture on the next page. The parallelogram is actually a square and each side has length $\sqrt{2}$; so the area is $\boxed{2}$. We can use cross product to calculate the area. The parallelogram is determined by the vectors \overrightarrow{AB} and \overrightarrow{AD} ; so the area is

$$\begin{aligned} |\overrightarrow{AB} \times \overrightarrow{AD}| &= \begin{vmatrix} \vec{i} & \vec{j} & \vec{k} \\ -1 & 1 & 0 \\ -1 & -1 & 0 \end{vmatrix} = \begin{vmatrix} 1 & 0 \\ -1 & 0 \end{vmatrix} \vec{i} - \begin{vmatrix} -1 & 0 \\ -1 & 0 \end{vmatrix} \vec{j} + \begin{vmatrix} -1 & 1 \\ -1 & -1 \end{vmatrix} \vec{k} \\ &= |0\vec{i} + 0\vec{j} + 2\vec{k}| = \boxed{2}, \end{aligned}$$

as we expected.

Picture for 12.4 # 35

