Answer on Question #40013, Math, Linear Algebra

Find the equation of the plane passing through i-j , i+j and k.

Solution

Let's find the equations of the plane that pass through the points A = (1,- 1, 0), B = (1, 1, 0) and C = (0, 0, 1).

$$\overrightarrow{AB} = (1 - 1, 1 - (-1), 0 - 0) = (0,2,0);$$

$$\overrightarrow{AC} = (0 - 1, 0 - (-1), 1 - 0) = (-1,1,1).$$

These points belong to the plane if the system has the solution:

$$\overrightarrow{AX} = \lambda \cdot \overrightarrow{AB} + \mu \cdot \overrightarrow{AC}:$$

$$\begin{cases} x - 1 = -\mu \\ y - (-1) = 2\lambda + \mu \\ z - 0 = \mu \end{cases}$$

$$\begin{vmatrix} x - 1 & 0 & -1 \\ y + 1 & 2 & 1 \\ z & 0 & 1 \end{vmatrix} = 0 \rightarrow x + z - 1 = 0.$$

Answer: $x + z - 1 = 0$.