

QUESTION

For what values of  $\alpha$  does the set of equations

$$\begin{aligned}\alpha x + y &= 0 \\ 4x + \alpha y &= 0\end{aligned}$$

have a non-trivial (non-zero) solution? (Do NOT solve the equations).

ANSWER

The equations

$$\begin{aligned}\alpha x + y &= 0 \\ 4x + \alpha y &= 0\end{aligned}$$

have a non-trivial solution if  $\begin{vmatrix} \alpha & 1 \\ 4 & \alpha \end{vmatrix} = \alpha^2 - 4 = 0$ ,  $\alpha = \pm 2$