

3) If  $2ax - 2y + 3z = 0$ ,  $x + ay + 2z = 0$  and  $2x + az = 0$  have a non-trivial solution, find the value of  $a$ .

solution: For non-trivial solution, we must have

$$\begin{vmatrix} 2a & -2 & 3 \\ 1 & a & 2 \\ 2 & 0 & a \end{vmatrix} = 0$$

$$\Rightarrow 2a(a-0) + 2(a-4) + 3(0-2a) = 0$$

$$\Rightarrow 2a^2 + 2a - 8 + 0 - 6a = 0$$

$$\Rightarrow 2a^2 - 4a - 8 = 0$$

$$\Rightarrow a^2 - 2a - 4 = 0$$

$$\Rightarrow a^3 - 2a^2 + 2a^2 - 4a + 2a - 4 = 0$$

$$\Rightarrow a^2(a-2) + 2a(a-2) + 2(a-2) = 0$$

$$\Rightarrow (a-2)(a^2 + 2a + 2) = 0$$

$$\Rightarrow a = \boxed{2}$$