

2) Find the value of λ if $2x^2 + 7xy + 3y^2 + 8x + 14y + \lambda = 0$ represent a pair of straight lines.

solution: $ax^2 + 2hxy + by^2 + 2gx + 2fy + c = 0$ represent a pair of lines if:

$$\begin{vmatrix} a & h & g \\ h & b & f \\ g & f & c \end{vmatrix} = 0$$

$$\Rightarrow \begin{vmatrix} 2 & 7/2 & 4 \\ 7/2 & 3 & 7 \\ 4 & 7 & \lambda \end{vmatrix} = 0$$

$$\Rightarrow 6\lambda + 2(7)(4)\left(\frac{7}{2}\right) - 2(7)^2 - 3(4)^2 - \lambda\left(\frac{7}{2}\right)^2 = 0$$

$$\Rightarrow 6\lambda + 196 - 98 - 48 - \frac{49\lambda}{4} = 0$$

$$\Rightarrow \frac{49\lambda}{4} - 6\lambda = 196 - 146 = 50$$

$$\Rightarrow \frac{25\lambda}{4} = 50 \therefore \lambda = \frac{200}{25} = 8$$