ANALYSIS OF THREE LINES

Let the line are

$$a_1x + b_1y + c_1 = 0$$
$$a_2x + b_2y + c_2 = 0$$
$$a_3x + b_3y + c_3 = 0$$

1. If the lines are concurrent, then

$$\Delta = \begin{vmatrix} a_1 & b_1 & c_1 \\ a_2 & b_2 & c_2 \\ a_3 & b_3 & c_3 \end{vmatrix} = 0$$

But vice versa may not be true, because $A = 0$, also for parallel lines.

2. If triangle is not formed then either lines are concurrent or two lines are parallel and third is not parallel to them or all three are parallel or all are coinciding lines.

3. The area of triangle formed by the lines

$y = m_1x + c_1, y = m_2x + c_2$ and $y = m_3x + c_3$ is $\frac{1}{2}\left|\sum \frac{(c_1 - c_2)^2}{m_1 - m_2}\right|$.