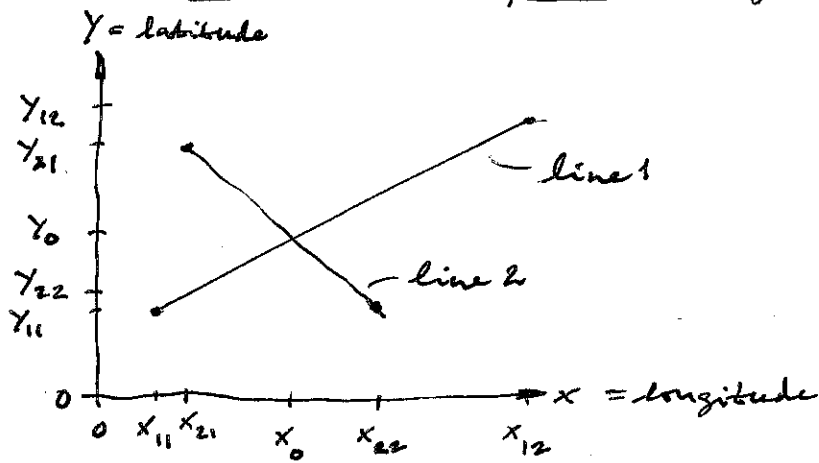


Intersection of two straight lines



The equation of line 1 is $y = s_1 x + i_1$

Put the known coordinates in:

$$\begin{cases} Y_{11} = s_1 X_{11} + i_1 \\ Y_{12} = s_1 X_{12} + i_1 \end{cases}$$

Subtraction gives $Y_{11} - Y_{12} = s_1 X_{11} - s_1 X_{12} \Rightarrow s_1 = \frac{Y_{11} - Y_{12}}{X_{11} - X_{12}}$

and then $i_1 = Y_{11} - s_1 X_{11} = Y_{11} - \frac{Y_{11} - Y_{12}}{X_{11} - X_{12}} X_{11}$

finally $y = \frac{Y_{11} - Y_{12}}{X_{11} - X_{12}} x + Y_{11} - \frac{Y_{11} - Y_{12}}{X_{11} - X_{12}} X_{11}$ (1)

In the same way, for line 2, you get

$$y = \frac{Y_{21} - Y_{22}}{X_{21} - X_{22}} x + Y_{21} - \frac{Y_{21} - Y_{22}}{X_{21} - X_{22}} X_{21} \quad (2)$$

Now, at Y_0 , the crossing point, (1) = (2)

$$Y_0 = \frac{Y_{11} - Y_{12}}{X_{11} - X_{12}} X_0 + Y_{11} - \frac{Y_{11} - Y_{12}}{X_{11} - X_{12}} X_{11} = \frac{Y_{21} - Y_{22}}{X_{21} - X_{22}} X_0 + Y_{21} - \frac{Y_{21} - Y_{22}}{X_{21} - X_{22}} X_{21}$$

From which

$$X_0 \left(\frac{Y_{11} - Y_{12}}{X_{11} - X_{12}} - \frac{Y_{21} - Y_{22}}{X_{21} - X_{22}} \right) = Y_{21} - \frac{Y_{21} - Y_{22}}{X_{21} - X_{22}} X_{21} - Y_{11} + \frac{Y_{11} - Y_{12}}{X_{11} - X_{12}} X_{11}$$

$$X_0 = \frac{Y_{21} - \frac{Y_{21} - Y_{22}}{X_{21} - X_{22}} X_{21} - Y_{11} + \frac{Y_{11} - Y_{12}}{X_{11} - X_{12}} X_{11}}{\frac{Y_{11} - Y_{12}}{X_{11} - X_{12}} - \frac{Y_{21} - Y_{22}}{X_{21} - X_{22}}} =$$