

The straight lines $y = kx + b$,
 $y = 2kx + 2b$ and $y = bx + k$ are
different and intersect at a point.
What is the POI?

Solution:

$$y = kx + b \quad (1)$$

$$y = 2kx + 2b \quad (2)$$

$$y = bx + k \quad (3)$$

From (1) and (2) $kx + b = 0$
which means $y = 0$.

From (1) and (3)

$$kx + b = bx + k$$

$$kx - bx = k - b$$

$$x(k - b) = k - b, \text{ for any } x$$

$x = 1$ (If $k = b$, the lines coincide
which cannot happen and so $x = 1$)

$$\text{Then } x = 1, y = 0$$

POI: $(1, 0) \rightarrow$ Sub and we get
 $k + b = 0, k = -b \neq 0$
is the necess. condition.