

PROBLEM. Find the barycentric coordinates of  $(6, 9)$  with respect to

$$\underset{A}{(2, 5)}, \quad \underset{B}{(5, 6)} \quad \text{and} \quad \underset{C}{(8, 13)}$$

SOLUTION Compute  $B-A$ ,  $C-A$

$$B-A = (3, 1), \quad C-A = (6, 8)$$

If  $X = (6, 9)$ , write  $(X-A)$  as a lin comb. of  $B-A$  and  $C-A$ .  $X-A = (4, 4)$ , so we get

$$(4, 4) = p(3, 1) + q(6, 8) = (3p+6q, p+8q)$$

The solution to 
$$\begin{aligned} 4 &= 3p + 6q \\ 4 &= p + 8q \end{aligned} \quad \text{is}$$

$$p = q = \frac{4}{9}. \quad \text{So } p = \frac{4}{9} \text{ \& } q = \frac{4}{9} \text{ are the}$$

barycentric coordinates with respect to  $B$  and  $C$  respectively. If  $r$  is the barycentric coord. w.r.t.

$$A, \text{ then } r = 1 - p - q = \frac{1}{9}.$$

If we plot points, we see that  $X$  appears to lie inside the triangle with vertices  $A, B, C$ . This observation will be formalized in Unit II.