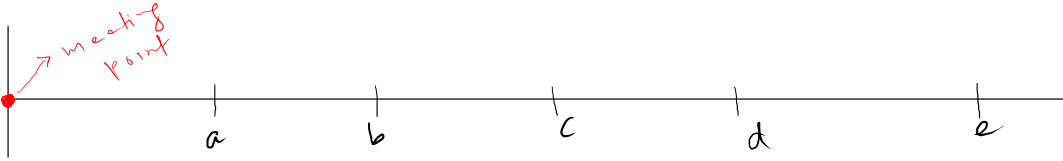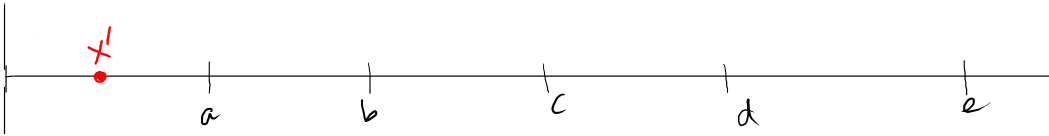# Best meeting point(distance travelled by all parties are minimum)
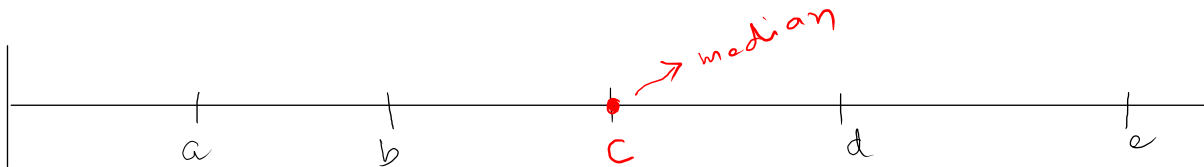
CASE1: Meeting point at origin

Total distance travelled by all parties to reach the meeting point : $a + b + c + d + e$

CASE1: Meeting point at X' near by origin

Total distance travelled by all parties to reach the meeting point : $(a - x') + (b - x') + (c - x') + (d - x') + (e - x')$

$$= a + b + c + d + e - 5x'$$
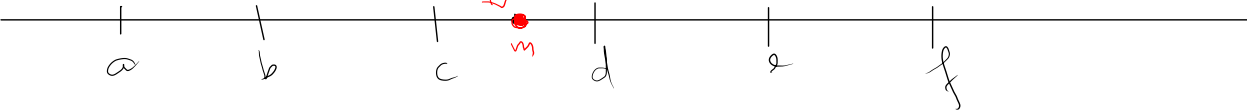
CASE3: Meeting point at median/mid point

Total distance travelled by all parties to reach the meeting point : $(c - a) + (c - b) + 0 + (d - c) + (e - c)$

$$= d + e - (a + b)$$

Thus, total distance travelled is minimum in CASE3, when meeting point is at median or mid point.

Median/mid and Total distance travelled in case of even number of parties

$$\text{median} = \frac{c+d}{2}$$

Total distance travelled = (m−a) + (m−b) + (m−c) + (d−m) + (e−m) + (f−m)

= d + e + f − (a + b + c)

Let's assume either 'c' or 'd' as a meeting point :

Using c as meeting point : (c −a) + (c−b) + 0 + (d−c) + (e−c) + (f−c)

= −a −b −c + d + e + f = d+e+f − (a+b+c)

Using d as meeting point: (d−a) + (d−b) + (d−c) + 0 + (e−d) + (f−d)

= −a −b −c + d + e +f = d+e+f − (a+b+c)

Total Distance travelled from all the three points m, c, d are same.