

In a set of $2n$ distinct observations, each of the observations below the median of all the observations is increased by 5 and each of the remaining observations is decreased by 3. Then the mean of the new set of observations:

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- (a) increases by 1
- (b) decreases by 1
- (c) decreases by 2
- (d) increases by 2

(a) There are $2n$ observations x_1, x_2, \dots, x_{2n}

$$\text{So, mean} = \sum_{i=1}^{2n} \frac{x_i}{2n}$$

Let these observations be divided into two parts x_1, x_2, \dots, x_n and x_{n+1}, \dots, x_{2n}

Each in 1st part 5 is added, so total of first part is $\sum_{i=1}^n x_i + 5n$.

In second part 3 is subtracted from each

So, total of second part is $\sum_{i=n+1}^{2n} x_i - 3n$

Total of $2n$ terms are

$$\sum_{i=1}^n x_i + 5n + \sum_{i=n+1}^{2n} x_i - 3n = \sum_{i=1}^{2n} x_i + 2n$$

$$\text{Mean} = \sum_{i=1}^{2n} \frac{x_i + 2n}{2n} = \sum_{i=1}^{2n} \frac{x_i}{2n} + 1$$

So, it increase by 1.