I'm having trouble generating the correct answer for #3 and #4 in the linear selection / sorting questions. We covered a question like this in class and used the formula \( \frac{n/5 - 1}{2} \cdot 3 + 2 \), where 5 is the group size, -1 takes away the MOM group, 3 is the number of elements greater/less than the MOM, and +2 adds the elements greater/less in the MOM group (these numbers are specific to question #3). The answer that I'm getting is checking out to be correct when I draw out the groups, but is not an option in the answers.

I get \( \frac{3n - 5}{10} \), which is one of the listed answers for #3.

Is there another formula that we should be following, because I have triple checked my math while using the one we used in class, and I'm not getting an answer that matches the options provided for any of the questions of this nature.

The correct answer, as I understand it, should actually be \( 3(n/10) + 2 \). Given that the number of groups is odd, the integer division of that number will inevitably return an integer, in this case \( 5/2 = 2 \), which gives the same answer as \( (5-1)/2 = 2 \), but ultimately because of integer division the -1 step is not needed to exclude the MoM group. But that's not the answer Dr. Lusth said he got, so in the end, what do I know?

How I got to \( 3(n/10) + 2 \):

Because each group has 5 unique elements, then there are \( n/5 \) groups. Because the number of groups is odd, by the principles of integer division I explained above, \( (n/5 - 1)/2 \) will give the same answer as simply \( (n/5)/2 \). Multiplying 3 by this quantity gives you the number less than the MoM in each of those \( n/10 \) groups (2 less than the group median + the group median = 3 per group) and then you add in the 2 values that are less than the MoM in it's particular group, thus \( 3(n/10) + 2 \).
The number of groups is odd, so when you remove the group with the MoM, there are an even number left.

\[
3(n/5 - 1)/2 + 2 \\
3(n/5 - 1)/2 + 4/2 \\
(3(n/5 - 1) + 4)/2 \\
(3n/5 - 3 + 4)/2 \\
(3n/5 + 1)/2 \\
(3n/5 + 5/5)/2 \\
(3n + 5)/2 \\
(3n + 5)/10
\]

Told you I sucked at math!

Subject: Re: Elements greater or less than the MOM
Posted by berryhilleric on Mon, 26 Sep 2016 22:50:37 GMT

Thank you! That is the answer I've been getting as well for that question. I've been following the same process for the other questions as well, but I haven't gotten an answer that matches for 4 and 5. There may be issues with those too.

Subject: Re: Elements greater or less than the MOM
Posted by oamohamed@crimson.ua.edu on Mon, 26 Sep 2016 22:56:10 GMT

isn't the 5 on the second term multiplied by 3 too, since we discount one group-assuming that we ignore the two elements in that group on the final answer.

Subject: Re: Elements greater or less than the MOM
Posted by oamohamed@crimson.ua.edu on Mon, 26 Sep 2016 23:49:39 GMT

not sure if the 2 on the last term is part of the multiple by three.
Subject: Re: Elements greater or less than the MOM
Posted by lusth on Tue, 27 Sep 2016 01:28:35 GMT

#4
2(n/3 - 1)/2 + 1
n/3 - 1 + 1
n/3

#5
4(n/7 - 1)/2 + 3
2(n/7 - 1) + 3
2n/7 - 2 + 3
2n/7 + 1
2n/7 + 7/7
(2n + 7)/7

Subject: Re: Elements greater or less than the MOM
Posted by oamohamed@crimson.ua.edu on Tue, 27 Sep 2016 03:13:05 GMT

i think the integer division will give us the group before the group that conclude MOM,in this case we do not have to subtract 1,to reach the group of MOM the book use ceiling on the division although the example with even number of group but it should work for both cases.