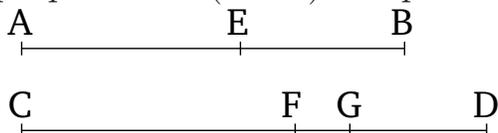


## Book 5

### Proposition 18

If separated magnitudes are proportional then they will also be proportional (when) composed.



Let  $AE$ ,  $EB$ ,  $CF$ , and  $FD$  be separated magnitudes (which are) proportional, (so that) as  $AE$  (is) to  $EB$ , so  $CF$  (is) to  $FD$ . I say that they will also be proportional (when) composed, (so that) as  $AB$  (is) to  $BE$ , so  $CD$  (is) to  $FD$ .

For if (it is) not (the case that) as  $AB$  is to  $BE$ , so  $CD$  (is) to  $FD$ , then it will surely be (the case that) as  $AB$  (is) to  $BE$ , so  $CD$  is either to some (magnitude) less than  $DF$ , or (some magnitude) greater (than  $DF$ ).<sup>‡</sup>

Let it, first of all, be to (some magnitude) less (than  $DF$ ), (namely)  $DG$ . And since composed magnitudes are proportional, (so that) as  $AB$  is to  $BE$ , so  $CD$  (is) to  $DG$ , they will thus also be proportional (when) separated [Prop. 5.17]. Thus, as  $AE$  is to  $EB$ , so  $CG$  (is) to  $GD$ . But it was also assumed that as  $AE$  (is) to  $EB$ , so  $CF$  (is) to  $FD$ . Thus, (it is) also (the case that) as  $CG$  (is) to  $GD$ , so  $CF$  (is) to  $FD$  [Prop. 5.11]. And the first (magnitude)  $CG$  (is) greater than the third  $CF$ . Thus, the second (magnitude)  $GD$  (is) also greater than the fourth  $FD$  [Prop. 5.14]. But (it is) also less. The very thing is impossible. Thus, (it is) not (the case that) as  $AB$  is to  $BE$ , so  $CD$  (is) to less than  $FD$ . Similarly, we can show that neither (is it the case) to greater (than

$FD$ ). Thus, (it is the case) to the same (as  $FD$ ).

Thus, if separated magnitudes are proportional then they will also be proportional (when) composed. (Which is) the very thing it was required to show.