

Reading Assignment 18: Archimedes and Exhaustion

Required Readings:

- Reread the sections from Euclid on the Eudoxian theory of proportions.
- Pages 325-329 (Sections α and β) of Thomas Little Heath. *A history of Greek mathematics*, volume 1. Clarendon, Oxford, England, 1921.
- Book XII: Propositions 1 and 2 of Euclid. *The Thirteen Books of Euclid's Elements: Books III-IX*, volume 2. Cambridge University Press, 1908
- Archimedes. *The Works of Archimedes*. Cambridge University Press, Cambridge, second edition, 2010:
 - “Measurement of the Circle.” Proposition 1.
 - “Quadrature of the Parabola.” Proposition 16.
- Archimedes. *The Method of Archimedes*. Cambridge University Press, Cambridge, 1912. Proposition 1.

Questions:

- Find two similarities among the following proofs: (1) Euclid's proof of Proposition 2 in Book XII of *The Elements*, (2) Archimedes' proof of Proposition 1 in “Measurement of the Circle”, and (3) Archimedes' proof of proposition 16 in “Quadrature of the Parabola.”
- In Archimedes' proof of Proposition 1 in *The Method*, he says, “. . . the triangle CFA is made up of all the parallel lines like MO , and the segment CBA is made up of all the straight lines like PO within the curve.” Explain in your own words what Archimedes might mean by the claim the triangle is “made up” by lines like MO .
- Explain the “essence” of Eudoxus' theory of proportions that allowed it to overcome difficulties that beset previous theories of proportions for Greek geometers.