

# MAU23302, Annual Examination 2022

## Syllabus of Examinable Material

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### **Euclid's *Elements of Geometry***

Candidates should be capable of giving proofs of propositions from the first four books Euclid's *Elements of Geometry*, as specified below, that are consistent with the theory presented in those books, and in particular are consistent with the ordering of propositions in those books. Moreover propositions from Proposition 29 of Book I onwards may not be applied in proofs of propositions preceding Proposition 29 of Book I. Where a proposition concerns a construction (that may be performed with straightedge and compasses) the validity of the construction should be proved.

The examinable propositions are the following:

**Book I** Propositions 16–21, 24–30, 32–36, 41–44, 47, 48.

**Book II** Propositions 5, 6, 11, 14.

**Book III** Propositions 3, 16, 18, 20, 21, 22, 31, 32, 35, 36, 37.

**Book IV** Propositions 2, 3, 4, 5, 10.

### **Non-Euclidean Geometry, Section 1**

Candidates should in particular be familiar with the definition of the following: *Riemann sphere*, *Stereographic projection*, *Möbius transformation*, *Cross-ratio*.

Proposition 1.5  
Corollary 1.6  
Proposition 1.8 (awareness of result only, proof not examinable)  
Proposition 1.9  
Proposition 1.10  
Proposition 1.11  
Lemma 1.14  
Lemma 1.16  
Proposition 1.23  
Proposition 1.24

## **Non-Euclidean Geometry, Section 2**

Candidates should in particular be familiar with the definition of the following: *Poincaré distance function on the unit disk, geodesic, complete geodesic, geodesic ray, geodesic segment.*

Lemma 2.1  
Proposition 2.2 (awareness of result only, proof not examinable)  
Corollary 2.3  
Lemma 2.4  
Proposition 2.5  
Lemma 2.8  
Proposition 2.9  
Lemma 2.10  
Proposition 2.11  
Proposition 2.19