

### Hints 3-4

- 3.1 If  $C$  and  $D$  lie on different sides with respect to  $AB$  then the segment  $CD$  intersects the line  $AB$ .
- 3.3 (\*) This is a direct computation based on the definition of isometry.
- 3.4 This is just to apply the definition of a discrete action and of an orbit space.
- 3.5 (\*) There are many ways to choose the group  $H$  for this question. Go for the easiest one: it will be helpful for later parts of this question.
- (d) If  $F$  is a fundamental domain for  $G$  and  $H$  is a subgroup of  $G$ , then  $F$  tiles the fundamental domain for  $H$  (why?). The index  $[G:H]$  may be found as the number of the tiles.
- 4.1 The geodesics on  $X$  come from geodesics on  $\mathbb{E}^2$  - just find the good ones.
- 4.2 Use lines of rational/irrational slopes on  $\mathbb{E}^2$ .
- 4.3 A couple of perpendicular bisectors will do the job.
- 4.4 (\*) Try to project something somewhere.