

## MATH 402 Homework 3

Due Friday 9/16/16

- (1) (5 pts.) Solve 2.5.4.
- (2) Understand the proof of Theorem 2.31, and write it out *in your own words*. This problem will not be graded.
- (3) (10 pts.) Prove Corollary 2.34 from the book: If a quadrilateral  $ABCD$  is inscribed in a circle, then its pairs of opposite angles are supplementary.
- (4) (5 pts.) We can define the angle between a circle  $\mathcal{S}$  and a line  $l$  which intersects  $\mathcal{S}$  at two points  $A, B$  one of two ways:
  - (a) Take the line  $l_A$  through  $A$  tangent to  $\mathcal{S}$ . Take the angle of intersection between  $l$  and  $l_A$  (i.e. the angle formed by  $l$  and  $l_A$  which is less than or equal to a right angle.) Call this angle  $\alpha_A$ .
  - (b) Take the line  $l_B$  through  $B$  tangent to  $\mathcal{S}$ . Take the angle of intersection between  $l$  and  $l_B$  (i.e. the angle formed by  $l$  and  $l_B$  which is less than or equal to a right angle.) Call this angle  $\alpha_B$ .Show that these two definitions give the same angle, i.e. show that  $\alpha_A = \alpha_B$ .  
If the line  $l$  is tangent to  $\mathcal{S}$  at a point  $T$ , what should the angle of intersection between  $l$  and  $\mathcal{S}$  be?
- (5) (5 pts.) How would you define the angle between two intersecting circles?
- (6) (15 pts.) Solve 5.1.2, 5.1.3, 5.1.4, and use them to prove that the set of isometries forms a *group* (as defined in Chapter 1.4).
- (7) (5 pts.) Solve 5.1.5.
- (8) (5 pts.) Solve 5.2.12.