

# Math 420 - Homework 2

September 4, 2012

This homework will constitute most of our coverage of Chapter 2 in the book. You will be expected to read through the book to answer these questions. This homework, unlike the previous one, will be graded and I expect it to either be typed or very neatly written.

## 1 Proofs

This section deals with proofs involving geometric objects we have described in class. Some of them we have glossed over, so you will be expected to go through the text to learn about them. You may also use the internet, as I find this a useful source of information.

### Question 1

From page 89: Prove that the shortest of all chords, passing through a point  $A$  taken in the interior of a given circle, is the one which is perpendicular to the diameter drawn through  $A$ .

### Question 2

From page 96: Prove that the shortest segment joining two non-intersecting circles lies on the line of centers.

### Question 3

From page 102: Let  $PA$  and  $PB$  be two tangents to a circle with center  $O$ , drawn from the same point  $P$ , and let  $BC$  be a diameter. Prove that  $CA$  and  $OP$  are parallel.

## 2 Constructions

This section deals with Geometric constructions that I would like you to work through. Once again, you can find this material in the book at the pages I have listed. Please use GeoGebra, or some other software, to complete these constructions, because it is the 21st century and I would be embarrassed to see my students using rulers and compasses.

### Construction 1

From page 83: Given three points not on a line (possibly  $(1, 2)$ ,  $(-1, 2)$ ,  $(0, 1)$ ) construct the circle that passes uniquely through them

### Construction 2

From page 92: Construct a circle which has a given radius  $r = 2$  and is tangent to the vertical line  $x = 2$ .

### Construction 3

From page 103: Given two circles (circle  $O$  has radius 2 and center  $(3, 4)$  and circle  $O'$  has radius 1 and center  $(0, 0)$ ) construct a common tangent line.