

Exam 2–Project. Due at the beginning of class on Tuesday, November 24, 2009

Name _____

One goal for this course is for you to develop your skill in effectively communicating mathematics. With this in mind, you should clearly write up your solutions. ***Solutions with little or no justification will receive little or no credit.*** Clear, organized, partially correct work may receive partial credit.

You may use any books you want for this exam, and you must cite those sources.

- (1) Use $d(P, Q)$ to denote the distance from point P to point Q . Consider a segment with labeled points Q_1, Q_2, \dots, Q_n . For which point P on the segment is the sum:

$$\sum_{i=1}^n d(P, Q_i),$$

a minimum?

- (2) Take an ellipse and a point P outside the ellipse. From point P , draw two distinct tangents to the ellipse, with tangency points A and B . Let F_1 and F_2 denote the foci of the ellipse. Prove that the angles $\angle F_1PA$ and $\angle F_2PB$ are congruent.
- (3) At some point while solving the "three cities problem," we constructed a circle from the three points of a triangle. Give a step by step method for constructing a circle through three given points and give a detailed *proof* that your method works.
- (4) Your textbook author gives several suggestions for computer explorations. Do either problem 26 or problem 28 from chapter 4, using a computer program such as Geometer's Sketchpad or Cinderella. You may do this problem alone or in a group of 2 or 3 students. Turn in *one* problem write-up for the group.