MATH 301/501 HOMEWORK 8?–DUE AT THE BEGINNING OF CLASS ON THURSDAY DECEMBER 5

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. A solution with little or no justification will receive little or no credit.

(1) Determine an equation for the set of all points in the plane whose distance from the fixed point (h, k) is the constant r. Show clearly how you determined this equation.

(2) (a) Write the definition for a parabola, which we gave in class.

(b) Use this definition to determine the equation for a parabola.

(c) Write the equation in vertex form, and explain what information you get from seeing the equation in this form.

(d) Write the equation in standard form. What information about the parabola can you easily obtain from this form.

(3) An ellipse can be defined as the locus of points, the sum of whose distances to two fixed points is a constant. Use this definition to determine the equation of an ellipse.

(4) In class we have been generating primitive Pythagorean triples. You showed that, given natural numbers x and y of opposite parity, with x, y relatively prime, we can generate a primitive Pythagorean triple. Does this give us *every* possible primitive Pythagorean triple? That is, given a Pythagorean triple, must it come from some pair x, y as described above. Prove your result.

(5) In class on Tuesday we will look at a geometric construction of Pythagorean triples. Carefully prove that the parameterization of Pythagorean triples we obtain geometrically coincides with our algebraic solution.

(6) Joanna shared with you a proof of the Pythagorean Theorem during her presentation in your methods course. Carefully explain (write) how this geometric explanation indeed provides a proof of the Pythagorean Theorem and its converse. Alternatively, you could give a different proof.