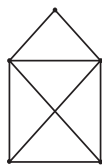




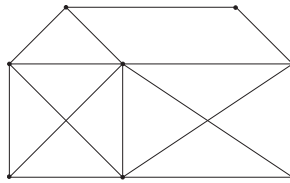
INTRO TO ABSTRACT MATH
FALL 2009

HOMEWORK 1
DUE AUGUST 31

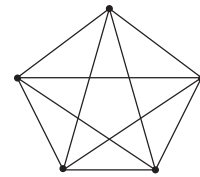
Exercise 1. Decide if the following graphs contain an Eulerian path. Justify your answer and discuss if it is relevant where the starting point is.



(a)



(b)



(c)

Exercise 2. Some (odd) prime numbers can be written as the sum of two squares, for example

$$5 = 1^2 + 2^2, \quad 13 = 2^2 + 3^2,$$

and some cannot, like 3 or 7. By looking at examples, find a criterion that seems to indicate exactly which prime numbers can be expressed as the sum of two squares.

Exercise 3.

- a. Find a precise description (as an equation or otherwise) of the shape of a catenary.
- b. Find a precise description (as an equation or otherwise) of the curve that solves the brachistochrone problem. What is the more common name for such a curve?

Suggestion: Your Calculus textbook or websites such as www.mathworld.com might be helpful references.