Homework 2

1. A celebrity couple wants to have a rectangular pool put in the backyard of their vacation home. They want it to be 24 meters long, and they insist that it have at least as much area as the neighbor's pool, which is a square 12 meters on a side. Find the dimensions of the smallest pool that meets these criteria.
2. A chemist mixes distilled water with a 90% solution of sulfuric acid to produce a 50% solution. If 5 liters of distilled water are used, how much 50% solution is produced?
3. The cruising speed of an airplane is 150 miles per hour (relative to the ground). You plan to hire the plane for a 3-hour sightseeing trip. You instruct the pilot to fly north as far as she can and still return to the airport at the end of the allotted time.
   a. How far north should the pilot fly if the wind is blowing from the north at 30 miles per hour?
   b. How far north should the pilot fly if there is no wind?
4. A minor chord is composed of notes whose frequencies are in the ratio 10:12:15. If the first note of a minor chord is A, with a frequency of 220 hertz, what are the frequencies of the other two notes?
5. The beer consumption by Americans for the years 1960–2005 can be modeled by the equation

$$y = - 0.0665x^2 = 3.58x + 122$$

where x is the number of years after 1960, and y is the number of ounces of beer consumed per person in that year. Find the per person consumption in 1960, then find in what year the model predicts that consumption will return to 122.

6. A 1,200 square foot rectangular garden is enclosed with 150 feet of fencing. Find the dimensions of the garden to the nearest tenth of a foot.
7. The daily price–demand equation for hamburgers at a fast-food restaurant is

$$q = 1600 – 200p$$

where q is the number of hamburgers sold daily and p is the price on one hamburger (in dollars). Find the demand and the revenue when the price of a hamburger is $3.

8. A search plane takes off from an airport at 6:00 A.M. and travels due north at 200 miles per hour. A second plane leaves that airport at the same time and travels due east at 170 miles per

hour. The planes carry radios with a maximum range of 500 miles. When (to the nearest minute) will these planes no longer be able to communicate with each other?

9. Find all numbers with the property that when the number is added to itself the sum is the same as when the number is multiplied by itself.