Worksheet 5

MATH 1A Fall 2015

for 20 October 2015

Exercise 5.1. Find $\frac{d}{dx} \arcsin x$. [Hint: it may be helpful to use implicit differentiation.]

Exercise 5.2. This is a problem that I have actually done with some friends in the past.

Berkeley campus is 178 acres, or about 7,750,000 square feet, and let's say a sheep occupies about 10 square feet. Suppose today (or at $t = 0$ or whatever) we buy two sheep, and suppose the reproductive cycle of these sheep lasts a year (gestation plus reaching maturity should only take about 5 + 6 months, but most sheep are seasonal breeders, so we can assume they breed once a year). Most sheep also have litters of 1-2 lambs, so let's say the number of sheep doubles each reproductive cycle (there will be some twins and some single lambs, but also maybe we have less rams than ewes; whatever).

1. Write a model for the number of sheep y we have as a function of time t (and maybe put time in units of years).
2. How long will it take before we can completely cover Berkeley campus with sheep?
3. Suppose I want to cover Berkeley with sheep before I graduate in 5 years. What's the least number of sheep I'd need to start with?