MA205 - Integral Calculus
Lesson 46: The Logistic Equation

1. Suppose a population grows according to a logistic model. Further, suppose the population has a carrying capacity ot $10,000$ and $k = 0.00182$ per year.

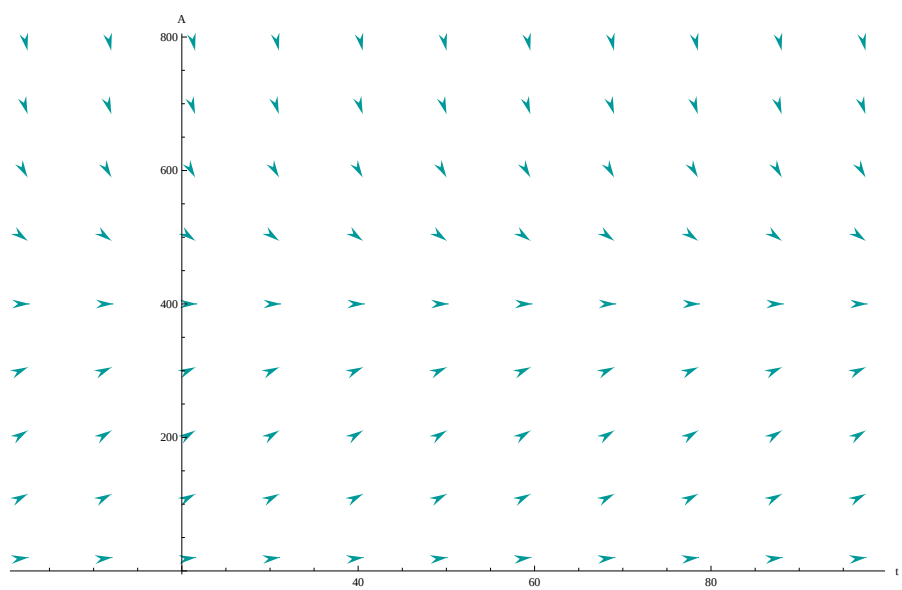
   (a) Write down a logistic differential equation that models the growth of this population.

   (b) What are the equilibrium solutions for this differential equation?

2. Suppose the following model represents the population of aligators in a certain Louisiana swamp:

$$\frac{dA}{dt} = 0.082A\left(1 - \frac{A}{400}\right)$$

   (a) This slope field for this differential equation is pictured below. Sketch solution curves when the initial population of aligators is 100, 300, 500, and 600.



   (b) What are the equilibrium solutions? Classify them as stable or unstable. Which of the solutions you sketched have inflection points?

   (c) Describe the long term behavior of each solution.