Name \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ **BC Differential Equations FRQ**

1. Liquid fertilizer is injected into a hydroponics growing system via a pumping system. The total amount of liquid fertilizer injected into the growing system by time *t* is modeled by the function F that satisfies the logistic differential equation , where *t* is measured in months and *F* is measured in liters. At time 3 liters of liquid fertilizer are injected into the growing system. (Note: Hydroponics is the process of growing plants in sand, gravel, or liquid, with added nutrients but without soil.)
2. Find b) Find c) Find
3. Consider the differential equation
4. On the axes provided, sketch a slope field for the given differential equation at the twelve points indicated, and sketch the solution curve that passes through the point .
5. The solution curve that passes through the point has a local minimum at . What is the y-coordinate of this local minimum?
6. Let be the particular solution to the given differential equation with the initial condition . Use Euler’s method, starting at with two steps of equal size, to approximate . Show the work that leads to your answer.
7. Find in terms of *x* and *y*. Determine whether the approximation found in part (c) is less than or greater than Explain your reasoning.