

9. [10 points] Vic is planning to put ladybugs in his garden to eat harmful pests. The ladybug expert at the gardening store claims that the number of ladybugs in his garden can be modeled by the differential equation

$$\frac{dL}{dt} = \frac{L}{20} - \frac{L^2}{100}$$

where L is the number of ladybugs, in hundreds, in Vic's garden, t days after they are introduced.

- a. [4 points] Find the equilibrium solutions to this differential equation and indicate their stability.

- b. [2 points] If Vic starts his garden with 50 ladybugs, what will the long term population of ladybugs in his garden be according to the differential equation above?

The long term population is _____

- c. [4 points] For what value of b is the function $L(t) = 5e^{bt} (4 + e^{bt})^{-1}$ a solution to this differential equation.

$b =$ _____