Homework 3 Computing Assignment

1. Use MAPLE (or your favorite mathematical software) to do all of the following (you will not receive credit for doing any of these by hand). All problems refer to the logistic differential equation:

\[ \frac{dP}{dt} = rP(K - P), \quad \text{with } r = .01 \text{ and } K = 100. \]

(a) Find the general solution of the equation.

(b) Find two different particular solutions, one each for the initial condition \( P(0) = 1 \) and \( P(0) = 200 \).

(c) Plot the two exact solutions from part (b) together on the same set of axes. Use a range of \( t \) from 0 to 10.

(d) Plot a slope field for the general ODE (provide no initial conditions). Use a range of \( t \) from 0 to 10 and a range of \( P \) from 0 to 200.

(e) Plot the slope field again, but this time also with the curves corresponding to initial conditions \( P(0) = 1, P(0) = 25, P(0) = 50, P(0) = 100, P(0) = 150, \) and \( P(0) = 200 \).

Please print out your MAPLE worksheet containing all the commands and results for the above. Attach your printout to your answers for the other homework questions.