Population with Harvesting: Feedback Rubric

Goal: To study the effect of various levels of harvesting on the steady state fish population gotten from the modified logistic equation:

\[
\frac{dP}{dt} = kP(1 - \frac{P}{N}) - C = f(P)
\]

Assignment Guidelines:

1. Calculate the equilibrium solutions for your equation. Include a graph of the function \(f(P)\) in the \((P, f(P))\) space. Show your calculation clearly. Explain how the equilibrium solutions are related to the graph.

2. Draw a phase line diagram for your equation. Explain the relationship between the phase line diagram and the \((P, f(P))\) graph.

3. Draw various solutions to your equation on a slope field diagram. How do you know whether a solution increases or decreases?

4. For the solution with initial condition \(P(t = 0) = .75\) units of fish, describe the long term behavior of the solution.

Feedback Guidelines:

Read through the paper and respond to the following items. In addition to saying YES or NO, also include comments that would help the author improve her write up. Or if that aspect of the write up is already excellent, say so.

Does the paper:

0. make clear in an introductory paragraph what is the problem that is being studied?

1a. calculate the equilibrium solution? Is the calculation shown clearly?

1b. include a graph of the function \(f(P)\) in the \((P, f(P))\) space?
1c. explain how the equilibrium solutions are related to the graph?

2a. include a phase line diagram?

2b. explain the relationship between the phase line diagram and the \((P, f(P))\) graph?

3a. have a slope field diagram?

3b. draw various solutions (for different initial conditions) of the equation on the slope field diagram?

3c. explain how to tell whether a solution increases or decreases?

4. describe the long term behavior of the solution with initial condition \(P(t = 0) = .75\) units of fish?