Pencils and Erasers Only – No Calculators Allowed.

1. Set up the differential equation and initial conditions for \( y(t) \), the amount (in pounds) of salt in the tank (below) \( t \) minutes after the start time.

A huge tank initially holds 500 gallons of a solution containing 2 pounds of salt per gallon of solution.

At start time, solution containing 1 pound of salt per gallon begins to run into the tank at 10 gallons/minute. Simultaneously mixed solution is pumped out of the tank at 7 gallons/minute.

Do not solve this initial-value problem – just set it up.
2. It is alleged that \( y_1(x) = x^4 \) and \( y_2(x) = \ln(x) y_1(x) \) are solutions of
\[
x^2 y'' - 7xy' + 16y = 0
\]
on \((0, \infty)\). Compute their Wronskian.