

Problems Day 5, F 2/9/2024

Topic 3: Input response

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Problem 1. We have a mixing tank. Initially it contains 60 l of pure H_2O . We add a salt solution with a concentration of 2 g/l at a rate of 3 l/min. At the same time, we draw off solution at 3 l/min.

Draw a picture and then model the amount of salt in the tank. After doing the other problems come back and solve the DE.

Problem 2. Show the DE $x'' + 8x' + 7x = f(t)$ is linear, i.e., satisfies the superposition principle.

Problem 3. Show that the DE $y' + y^2 = q(t)$ does not satisfy the superposition principle. ($q(t)$ = “input” can be any function.)

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ES.1803 Differential Equations

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