The following written homework problems are due on 9/29 (Wednesday) or 9/30 (Thursday). *You also have a WebWork assignment due two days before the written homework.*

(3.1) Give the general solution for the following differential equations:

(a) $4y'' - 12y' + 9y = 0$

(b) $4y'' - 4y' + 5y = 0$

(c) What is the particular solution to part (b) if $y(\pi) = e^{\frac{\pi}{2}}$ and $y'(\pi) = 0$?

(3.2) Solve the initial-value problem $x^2 \frac{dy}{dx} - y = 2e^{\frac{1}{x}}$, $y(1) = -e$.

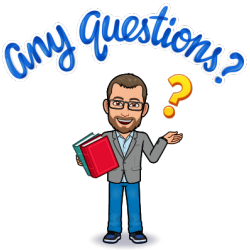
(3.3) Professional Problem. A tank at a chocolate factory contains 100L of pure melted chocolate. At noon, an Oompa Loompa starts adding a top-secret mixture of crushed Oreo and melted chocolate into the tank. The concentration of Oreo is unknown, but it flows in at a rate of 5 L/min. At the same time, another Oompa Loompa starts draining the tank into the chocolate river at a rate of 3 L/min. Assume that the chocolate tank remains thoroughly mixed.

(a) Let M represent the unknown concentration of Oreo that is flowing in. Find an initial value problem that models the **amount** (not concentration) of Oreo in the tank after t minutes. Your equation should involve M.

(b) Solve the initial value problem. Your answer should involve M.

(c) If, after 20 minutes, the tank contains 32 kg of Oreo, find the concentration M of Oreo in the top secret mixture. (*Tip:* The numbers will be sort of nice, but not that nice. Use WolframAlpha, or other software to help!)

You should have questions! When you do, here's what to do:



1. Post your question on Canvas: http://canvas.umn.edu/
   The answers you get will help everyone in the class!
2. Email *all* of the instructors with your question.
3. Write your solution (even if you're unsure about it) and bring it to the study session. Ask an instructor *specific questions* about it.
4. Start an impromptu study session on Google Chat or similar service!

Instructor	*Email*	*Instructor*	*Email*
Kris Hollingsworth	kgh@umn.edu	Sarah Lanand†	pain0038@r.umn.edu
Robert Hank	hankx003@umn.edu	Eric Erdmann⋆	erdm0063@d.umn.edu

†Rochester, ⋆Duluth