## MATH 2340 WARM-UP PROBLEMS

- 1. What are the general solutions to the following differential equations:
  - (a) y' = 7y
  - (b) y' + 3y = 0
  - (c) 8y' + 4y = 0
- 2. Consider the differential equation

$$y'' - 7y' + 12y = 0.$$

(a) Classify the differential equation.

(b) Verify that  $y_1(x) = e^{3x}$  and  $y_2(x) = e^{4x}$  are both solutions to the differential equation.

(c) Under what conditions is  $y_3(x) = c_1 e^{3x} + c_2 e^{4x}$  also a solution to the differential equation?

Please turn over the page for more fun!  $\longrightarrow$ 

3. Consider the differential equation

$$r(x)y'' + p(x)y' + q(x)y = 0.$$

(a) Classify the differential equation.

(b) Assume that  $y_1(x)$  and  $y_2(x)$  are both solutions to the above differential equation. Under what conditions is  $y_3(x) = c_1y_1(x) + c_2y_2(x)$  also a solution?

(c) What do you think is special about the differential equation r(x)y'' + p(x)y' + q(x)y = 0 that allows the above statement to be true.