- Please put your name, ID number, and section number (or time) on your blue book. **If you fail to do this, you will probably get your exam back late.**
- The first page of your blue book may contain notes. No other paper is allowed.
- **You must show your work to receive credit.**
- *Remember to watch out for division by zero!*

1. (84 pts) Solve each of the following differential equations. If no initial conditions are given, find the general solution. You may find the following integral useful

$$\int x^n e^{ax} dx = \frac{x^n e^{ax}}{a} - \int \frac{n x^{n-1} e^{ax}}{a} dx.$$

   (a) $x\,dx + 2ye^{-x}\,dy = 0, \quad y(0) = 2.$

   (b) $x\,dt = (3x^2 - t)dx.$

   (c) $ye^x\,dx + (y + e^x)dy = 0.$

   (d) $dy = 2xy^2\,dx, \quad y(0) = 0.$

   (e) $y'' - 4y' - 5y = 0.$

   (f) $y'' - 4y' + 5y = 0, \quad y(0) = 0, \quad y'(0) = 1.$

2. (16 pts) This problem deals with the differential equation

$$y' = y - y^3.$$

   (a) What are its equilibrium points?

   (b) Which equilibrium points are stable and which are unstable?

   (c) If $y(0) = 1/2$, what is $\lim_{t\to\infty} y(t)$? Give a reason for your answer.

The final is 8–11 AM on Tuesday March 21st. **Note the room for your section.**

The exam is in **Solis 107** for sections A01 and A02 (Jason Bell).
The exam is in **Solis 107** for sections A03 and A04 (Larry Bassel).
The exam is in **HSS 2250** for sections A05 and A06 (Pete Couperus).