

**Problem Set 1      Differential Equations      Due 1/25/06**

You are encouraged to work in groups of two to four on this assignment and make a single group submission. Each problem is worth 5 points. For full credit indicate clearly how you reached your answer. All work must be legible and submitted on clean paper without ragged edges.

1. Find a general solution to the differential equation  $\frac{dP}{dt} = kP(1 - P)$ .
  
2. [Blanchard et al. 3<sup>rd</sup> Ch. 1 Review] The air in a small rectangular room 20 ft by 5 ft by 10 ft is 3% carbon monoxide. Starting at  $t = 0$ , air containing 1% carbon monoxide is blown into the room at the rate of 100 ft<sup>3</sup> per hour and well mixed air flows out through a vent at the same rate.
  - a) Write an initial-value problem for the amount of carbon monoxide in the room over time.
  - b) When will the air in the room be 2% carbon monoxide?
  - c) What will happen to the level of carbon monoxide in the air over the long term?
  
3. Do problem #24 in §1.3.