Math 217 - September 16, 2010

- Population Models
- Stability

1. Draw slopefields/solution curves for the following differential equations. Find all equilibrium solutions.

   (a) $x' = (x-1)$

   (b) $x' = (x-1)(x-2)$

   (c) $x' = x(x-1)(x-2)$

   (d) $x' = x^2(x-1)(x-2)$

   (e) $x' = x^2(x-1)(x+1)$

   (f) $x' = x(x-1)^2(x+1)^2$

Lecture Problems

2. Determine equilibrium solutions and stability for

   (a) $x'(t) = kx(M-x); \qquad k, M > 0$

   (b) $x'(t) = kx(x-M); \qquad k, M > 0$

3. Determine equilibrium solutions and stability for

   (a) $x'(t) = x(x-4) - 1$

   (b) $x'(t) = x(x-4) - 4$

   (c) $x'(t) = x(x-4) - 5$

   (d) $x'(t) = x(x-4) - 8$

4. Determine equilibrium solutions and stability for

   (a) $x'(t) = 0$

   (b) $x'(t) = \begin{cases} x & x \geq 0 \\ 0 & x < 0 \end{cases}$

   (c) $x'(t) = \begin{cases} 1 & x \geq 0 \\ 0 & x < 0 \end{cases}$

   (d) $x'(t) = \begin{cases} 1 & x > 0 \\ 0 & x \leq 0 \end{cases}$