MthSc 208: Differential Equations (Summer II, 2012)
In-class Worksheet 1a: Plotting slope fields

NAME:

Consider the ODE $y' = 2y + t$.

(a) Draw the ty-plane (i.e., t on the x-axis, and $y(t)$ on the x-axis). Draw a dot at each integer lattice point at each (t, y), where $t, y = -1, 0, 1$.

(b) At each of these nine points, compute $y'(t)$. On the ty-plane, draw a "hash mark" at (t, y) with slope $y'(t)$.

(c) Now, we will use a better method to sketch the slope field. Determine the set of points for which $y' = 0$ (it will be a line – set $y' = 0$ and solve for y.)

(d) Repeat the previous step except for $y' = c$, for various values of c: 1, 2, 3, -1, $-\frac{1}{2}$.

(e) Sketch the lines you found above on the ty-plane. Along each line, sketch the hash-marks of the corresponding slope, $y' = c$.

(f) In the slope field above, sketch the three particular solution curves that satisfy $y(0) = 1$, $y(0) = -\frac{3}{4}$, and $y(1) = -\frac{3}{4}$, respectively.