## Math 2080: Differential Equations Worksheet 1.2: Plotting solutions to differential equations

## NAME:

Consider the ODE y' = y - t.

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

- 2. In this problem, we will use a better method to sketch the slope field of y' = y t using isoclines.
  - (a) Determine the set of points for which y' = 0 (it will be a line set y' = 0 and solve for y.)
  - (b) Repeat the previous step except for y' = c, for various values of  $c: 1, 2, 3, -1, -\frac{1}{2}$ .

(d) 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.

3. Find the steady-state solutions to the automonous ODE y' = (y+2)(y-1). Sketch these solutions on the *ty*-plane, as well as the curves of three three particular solutions that satisfy y(0) = -3, y(0) = 0, and y(0) = 3, respectively.