

Part I Problems

For each of the following ODE's, draw a direction field by using about five isoclines; the picture should be square, using the intervals between -2 and 2 on both axes. Then sketch in some integral curves, using the information provided by the direction field. Finally, do whatever else is asked.

Problem 1: $y' = -\frac{y}{x}$. Solve the equation exactly and compare your integral curves with the correct ones.

Problem 2: $y' = 2x + y$. Find a solution whose graph is also an isocline, and verify this fact analytically (i.e., by calculation, and not from a picture).

Problem 3: $y' = \frac{1}{x+y}$. Use the interval -3 to 3 on both axes; draw in the integral curves that pass respectively through $(0,0)$, $(-1,1)$, $(0,-2)$. Will these curves cross the line $y = -x - 1$? Explain by using the Intersection Principle.

MIT OpenCourseWare
<http://ocw.mit.edu>

18.03SC Differential Equations
Fall 2011

For information about citing these materials or our Terms of Use, visit: <http://ocw.mit.edu/terms>.