BC CALCULUS PRACTICE 9.2 **Name:** ______________________________ **Period** ________

Aisle __________

Pg. 593: 44, 45
pg. 600; 1, 3, 7, 9, 13, 15, 19
Show all necessary work neatly.

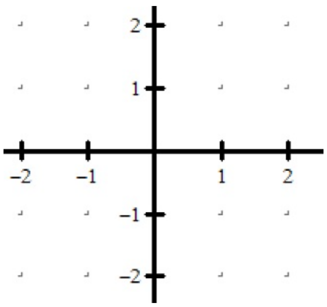
Pg.593

44. A tank initially contains 200 gal of pure water. Then at time t=0 brine containing 5 lb of salt per gallon of brine is allowed to enter the tank at a rate of 20 gal/min and the mixed solution is drained from the tank at the same rate.
(a) How much salt is in the tank at an arbitrary time t?
(b) How much salt is in the tank after 30 minutes?

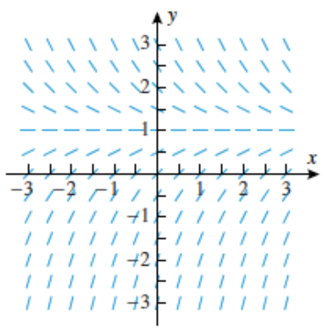
45. A tank with a 1000-gal capacity initially contains 500 gal of water that is polluted with 50 lb of particulate matter. At time $t = 0$, pure water is added at a rate of 20 gal/min and the mixed solution is drained off at a rate of 10 gal/min. How much particulate matter is in the tank when it reaches the point of overflowing?

Pg.600

1. Sketch the slope field for $y' = \frac{xy}{4}$ at the 25 gridpoints (x, y), where $x = -2, -1, \ldots, 2$ and $y = -2, -1, \ldots, 2$.



3. A direction field for the differential equation $y' = 1 - y$ is shown in the accompanying figure. In each part, sketch the graph of the solution that satisfies the initial condition.
(a) $y(0) = -1$ (b) $y(0) = 1$ (c) $y(0) = 2$



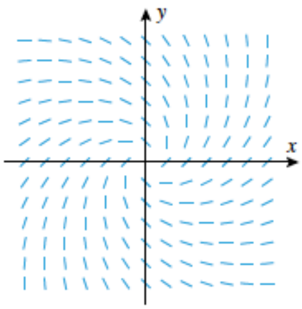
7. Use the direction field in Exercise 3 to make a conjecture about the behavior of the solutions of $y' = 1 - y$ as $x \to +\infty$, and confirm your conjecture by examining the general solution of the equation.

9. In each part, match the differential equation with the direction field (see next page), and explain your reasoning.

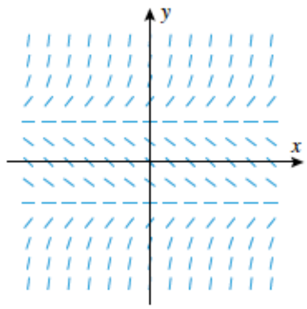
(a) $y' = 1/x$ (b) $y' = 1/y$ (c) $y' = e^{-x^2}$

(d) $y' = y^2 - 1$ (e) $y' = \dfrac{x+y}{x-y}$

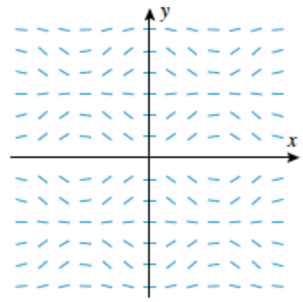
(f) $y' = (\sin x)(\sin y)$



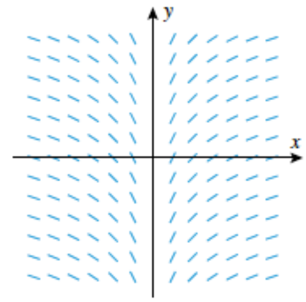
I



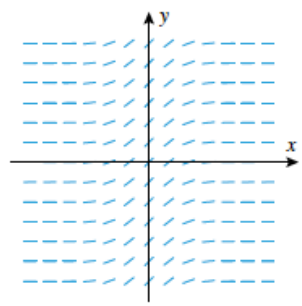
II



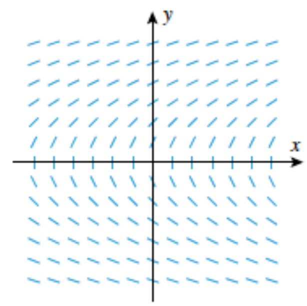
III



IV



V



VI

In Exercises 13–16, use Euler's Method with the given step size Δx to approximate the solution of the initial-value problem over the stated interval. Present your answer as a table and as a graph.

13. $\frac{dy}{dx} = \sqrt[3]{y}; y(0) = 1; 0 \le x \le 4; \Delta x = 0.5$

15. $\frac{dy}{dt} = \cos y\,; y(0) = 1; 0 \le t \le 2; \Delta t = 0.5$

19. The accompanying figure shows a direction field for the differential equation $y' = -x/y$.

(a) Use the direction field to estimate $y\left(\frac{1}{2}\right)$ for the solution that satisfies the given initial condition $y(0) = 1$.

(b) Compare your estimate to the exact value of $y\left(\frac{1}{2}\right)$.