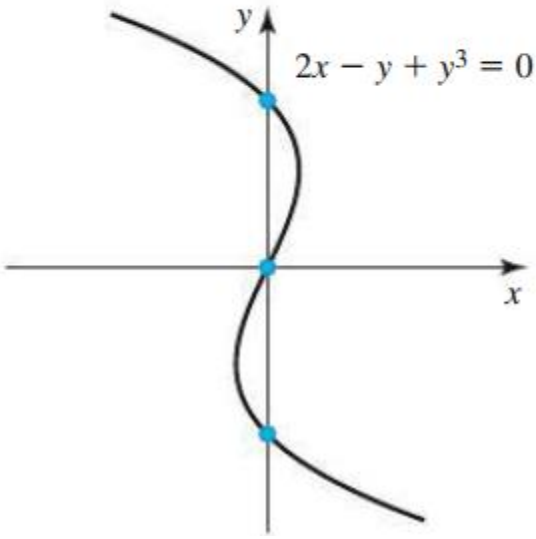
3.8 Group Activity Problems

9. Consider the curve defined by $2x - y + y^3 = 0$ (see figure).

a. Find the coordinates of the y-intercepts of the curve.

b. Verify that $\dfrac{dy}{dx} = \dfrac{2}{1 - 3y^2}$.

c. Find the slope of the curve at each point where $x = 0$.



13–26. Implicit differentiation *Carry out the following steps.*

a. *Use implicit differentiation to find* $\frac{dy}{dx}$.

b. *Find the slope of the curve at the given point.*

20. $\tan xy = x + y; (0, 0)$

22. $\frac{x}{y^2 + 1} = 1; (10, 3)$

24. $x^{2/3} + y^{2/3} = 2; (1, 1)$

27–40. Implicit differentiation *Use implicit differentiation to find* $\frac{dy}{dx}$.

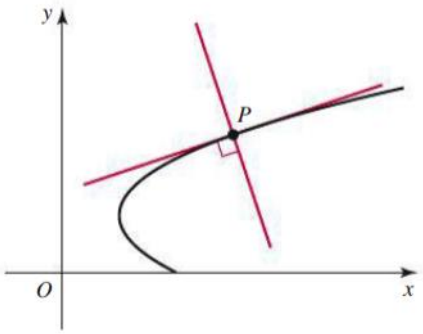
32. $e^{xy} = 2y$

64. Vertical tangent lines

a. Determine the points where the curve $x + y^3 - y = 1$ has a vertical tangent line (see Exercise 60).

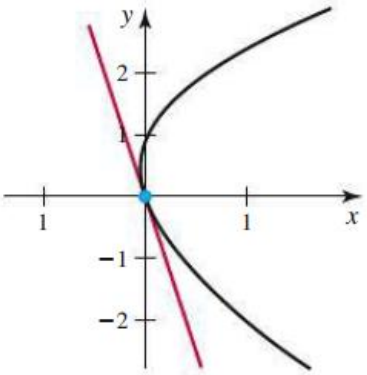
b. Does the curve have any horizontal tangent lines? Explain.

73–78. Normal lines *A* **normal line** *at a point P on a curve passes through P and is perpendicular to the line tangent to the curve at P (see figure). Use the following equations and graphs to determine an equation of the normal line at the given point. Illustrate your work by graphing the curve with the normal line.*



73. Exercise 45

45. $\sin y + 5x = y^2; (0, 0)$



75–86. Logarithmic differentiation *Use logarithmic differentiation to evaluate* $f'(x)$.

84. $f(x) = (1 + x^2)^{\sin x}$

85. $f(x) = \left(1 + \frac{1}{x}\right)^x$