PROBLEMS

In problems 1 – 10 find dy/dx in two ways: (a) by differentiating implicitly   and (b) by explicitly solving for y and then differentiating. Then find the value of dy/dx at the given point using your results from both the implicit and the explicit differentiation.

1. $x^2 + y^2 = 100$, point (6, 8)   2. $x^2 + 5y^2 = 45$, point (5, 2)

3. $x^2 - 3xy + 7y = 5$, point (2,1)   4. $\sqrt{x} + \sqrt{y} = 5$, point (4,9)

5. $\dfrac{x^2}{9} + \dfrac{y^2}{16} = 1$, point (0,4)   6. $\dfrac{x^2}{9} + \dfrac{y^2}{16} = 1$, point (3,0)

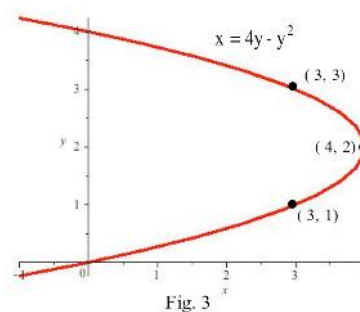7. $\ln(y) + 3x - 7 = 0$, point (2,e)   8. $x^2 - y^2 = 16$, point (5,3)

9. $x^2 - y^2 = 16$, point (5,–3)   10. $y^2 + 7x^3 - 3x = 8$, point (1,2)
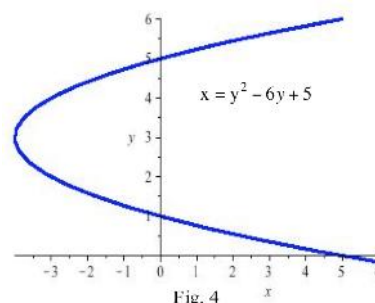
11. Find the slopes of the lines tangent to the graph in Fig. 3 at the points (3,1), (3,3), and (4,2) .

12. Find the slopes of the lines tangent to the graph in Fig. 3 where the graph crosses the y–axis.

Fig. 3

13. Find the slopes of the lines tangent to the graph in Fig. 4 at the points ((5,0), (5,6), and (–4,3).

14. Find the slopes of the lines tangent to the graph in Fig. 4 where the graph crosses the y–axis.

Fig. 4

In problems 15 – 22 , find dy/dx using **implicit differentiation** and then find the slope of the line tangent to the graph of the equation at the given point.

15. $y^3 - 5y = 5x^2 + 7$,   point (1,3)   16. $y^2 - 5xy + x^2 + 21 = 0$, point (2,5)

17. $y^2 + \sin(y) = 2x - 6$, point (3,0)   18. $y + 2x^2y^3 = 4x + 7$, point (3,1)

19. $e^y + \sin(y) = x^2 - 3$, point (2,0)   20. $(x^2 + y^2 + 1)^2 - 4x^2 = 81$, point $(0, 2\sqrt{2})$

21. $x^{2/3} + y^{2/3} = 5$, point (8,1)   22. $x + \cos(xy) = y + 3$, point (2,0)