Calculus Worksheet #4 Unit 5 page 1 _____

Use implicit differentiation to find dy/dx for each of the following equations. Show your work neatly organized.

1. $x^2 + y^2 = 16$

2. $2x^2 + xy - y^2 = 2$

3. $4x^2 + 9y^2 = 36$

4. $x^2 + y^2 + 4x + 2y - 11 = 0$

5. $x^2 - 4y^2 = 16$

6. $9x^2 - 4y^2 + 18x + 16y + 29 = 0$

7. $y^2 + 3xy - 4x^2 = 10$

8. $5y^2 + 8xy - 5x + 5y + 10 = 0$

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Find the equation of the line that is tangent to the graph of the given equation at the given point. Sketch a graph of the given equation showing the tangent line.

9. $x^2 + y^2 = 25$; (3,-4)

10. $xy = 12$; (-3,-4)

11. $x^2 - y^2 = 16$; (5,-3)

12. $4x^2 + y^2 + 8x - 4y - 8 = 0$; (-3,2)

Find the equation of the line that is normal to the graph of the given equation at the given point. Sketch a graph of the given equation showing the normal line.

13. $x^2 + y^2 = 25$; (-3,-4)

14. $xy = -6$; (3,-2)

15. $x^2 - y^2 = 16$; (5,-3)

16. $x^2 + y^2 - 4x + 2y - 20 = 0$; (-1,3)