

Tangent and Normal Lines ... Practice Set 1

1-12: For each function below

- Sketch a graph of $f(x)$,
- Find the slope at point P,
- Find the equation of the tangent line at point P. Sketch this line
- Find the equation of the normal line at point P. Sketch this line too.

1. $y = x^2 - 3$, $P(2,1)$

7. $y = 6x^{-1}$, $P(3,2)$

2. $y = 6 - x^2$, $P(2,2)$

8. $y = x^3 - x$, $P(-1,0)$

3. $y = 4x - x^2$, $P(2,4)$

9. $y = 2 - \sqrt{x}$, $P(4,0)$

4. $y = x^2 - x - 6$, $P(3,0)$

10. $y = 4x^2 - x^4$, $P(\sqrt{2},4)$

5. $y = x^3 - x$, $P(1,0)$

11. $y = 2 - 4x^{-2}$, $P(2,1)$

6. $y = x^{1/2}$, $P(4,2)$

12. $y = 1 + x^{2/3}$, $P(0,1)$

13-17: At the specified point, find the equation of the normal line to the curve $f(x)$

13. $f(x) = x^2$; where $x = -3$

16. $f(x) = x^{1/2}$, $x \geq 0$; where $x = 1$

14. $f(x) = x^2 - x$; where $x = 1$

15. $f(x) = x^3$; where $x = 1$

17. $f(x) = 9x^{-1}$, $x \neq 0$; where $x = 3$

18. Use the DEFINITION OF THE DERIVATIVE to find $f'(x)$ if $f(x) = x^3 + 2x$

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Answers

1. 4, $y = 4x - 7$, $y = -\frac{1}{4}x + \frac{3}{2}$	2. -4, $y = -4x + 10$, $y = \frac{1}{4}x + \frac{3}{2}$
3. 0, $y = 4$, $x = 2$	4. 5, $y = 5x - 15$, $y = -\frac{1}{5}x + \frac{3}{5}$
5. 2, $y = 2x - 2$, $y = -\frac{1}{2}x + \frac{1}{2}$	6. $\frac{1}{4}$, $y = \frac{1}{4}x + 1$, $y = -4x + 18$
7. $-\frac{2}{3}$, $y = -\frac{2}{3}x + 4$, $y = 4x - 16$	8. 2, $y = 2x + 2$, $y = -\frac{1}{2}x - \frac{1}{2}$
9. $-\frac{1}{4}$, $y = -\frac{1}{4}x + 1$, $y = 4x - 16$	10. 0, $y = 4$, $x = \sqrt{2}$
11. 1, $y = x - 1$, $y = -x + 3$	12. undefined, no tangent, no normal
13. $y = \frac{1}{6}x + \frac{19}{2}$	14. $y = -x + 1$
15. $y = -\frac{1}{3}x + \frac{4}{3}$	16. $y = -2x + 3$
17. $y = x$	18. $3x^2 + 2$

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