Learn: Package Rule

Example: $f(x) = 4(1+7x)^9 \Rightarrow f'(x) = (9)(4)(1+7x)^{9-1}(7) = 252(1+7x)^8$

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1. At the specified point, find the equation of the normal to the curve: $f(x) = \sqrt{100 - x^2}$
if domain = $x \le 10$;   Point = $(-6, \underline{\quad})$

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2. For what value of k, for $g(x) = \dfrac{-1}{4}x + k$, is g a **normal** to $f(x) = x^2 + 1$ (hint: you know the

slope!)

Directions: find f '(x) for problems 3−16

3. $f(x) = (3x+2)^8$	4. $f(x) = (1-x)^6$	5. $f(x) = (1-2x^2)^3$
6. $f(x) = (1+x^2)^5$	7. $f(x) = \dfrac{1}{(x^2+2)^3}$	8. $f(x) = \sqrt{x+1}$
9. $f(x) = (2x^3 - 3x + 1)^4$	10. $f(x) = \sqrt{x^2 + 2x - 1}$	11. $f(x) = \dfrac{1}{\sqrt[3]{x+3}}$
12. $f(x) = (x^2 - 4)^{\frac{-1}{2}}$	13. $f(x) = 6x^4 - 8x^3$	14. $f(x) = x^2(x^2 - 3)$
15. $f(x) = (x^3 - 2x)(3x^2)$	16. $f(x) = \dfrac{1}{x^5}$	

Write the equation of the normal at the given point.

17. $f(x) = 2x^3 - 2x - 7$ at $[-1, f(-1)]$ 18. $f(x) = (2x+3)^3$ at $[0, f(0)]$

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19. $f(x) = \sqrt{x-1}$ at $[5, f(5)]$ 20. $f(x) = \dfrac{2}{x^3}$ at $[2, f(2)]$

Answers:

1. $y - 8 = -\dfrac{4}{3}(x + 6)$	2. $k = 5\dfrac{1}{2}$	3. $24(3x + 2)^7$	4. $-6(1 - x)^5$
5. $-12x(1 - 2x^2)^2$	6. $10x(1 + x^2)^4$	7. $\dfrac{-6x}{(x^2 + 2)^4}$	8. $\dfrac{1}{2\sqrt{x + 1}}$
9. $4(2x^3 - 3x + 1)^3 \left(6x^2 - 3\right)$	10. $\dfrac{(x + 1)}{\sqrt{x^2 + 2x - 1}}$	11. $\dfrac{-1}{3\sqrt[3]{(x + 3)^4}}$	12. $\dfrac{-x}{(x^2 - 4)^{\frac{3}{2}}}$
13. $24x^2(x - 1)$	14. $2x(2x^2 - 3)$	15. $3x^2(5x^2 - 6)$	16. $\dfrac{-5}{x^6}$
17. $y + 7 = \dfrac{-1}{4}(x + 1)$	18. $y = \dfrac{-1}{54}x + 27$	19. $y = -4x + 22$	20. $y = \dfrac{8}{3}x - \dfrac{61}{12}$