Calculus 1   Worksheet #10
Power Rule

Learn: The Power Rule: $f(x) = a(\Box)^{\Delta} \Rightarrow f'(x) = \Delta \bullet a(\Box)^{(\Delta-1)}$

Example: $f(x) = \dfrac{1}{2}x^8 \Rightarrow f'(x) = 8\left(\dfrac{1}{2}\right)x^{8-1} = 4x^7$

Using the power formula, find the derivatives of the functions whose equations are given in Ex. 1–24.

1. $f(x) = x^4$ 2. $y = 4x^3$ 3. $f(x) = 5x^4$ 4. $f(x) = \dfrac{1}{12}x^6$ 5. $y = \dfrac{1}{9}x^3$ 6. $f(x) = -7x$

7. $f(x) = x$ 8. $y = 3$ 9. $f(x) = x^{-1}, x \neq 0$ 10. $f(x) = x^2 + x$ 11. $y = x^3 - x$

12. $f(x) = 3x^2 - 4x + 6$ 13. $f(x) = 10x - x^3$ 14. $y = x - 2x^3$ 15. $f(x) = x\,(x–3)$

16. $f(x) = (x-2)^2$ 17. $y = x^2(5 - x)$ 18. $f(x) = mx+b$ 19. $f(x) = ax^2 + bx + c$

20. $y = 2x^{-1}, x \neq 0$ 21. $f(x) = \dfrac{1}{3}x^{-3}, x \neq 0$ 22. $f(x) = 4\sqrt{x}, x \geq 0$ 23. $y = \sqrt[3]{x^2}$ 24. $f(x) = \sqrt{x^3}, x \geq 0$

In Ex. 25–30, find the **slope** at the indicated values of the curve whose equation is given.
25. $y = 3x + 7$; $x = -1, 2$ 26. $y = x^2$; $x = 0,1,2$

27. $y = x^3 - x$; $x = -2, -1, 0, 1, 2$ 28. $y = \dfrac{1}{x}, x \neq 0,\ x = -2, 2, -1, 1$

29. $y = (x–1)^3$; $x = 0,1,2$

30. Use the **<u>DEFINTION OF THE DERIVATIVE</u>** to find f '(x) if f (x) = $2x^2 + 5x - 6$

Answers:

1. $4x^3$	2. $12x^2$	3. $20x^3$	4. $\dfrac{x^5}{2}$
5. $\dfrac{x^2}{3}$	6. -7	7. 1	8.0
9. $\dfrac{-1}{x^2}$	10. $2x + 1$	11. $3x^2 - 1$	12. $2(3x-2)$
13. $10 - 3x^2$	14. $1 - 6x^2$	15. $2x - 3$	16. $2\,(x - 2)$
17. x (10 – 3x)	18. m	19. $2ax + b$	20. $\dfrac{-2}{x^2}$
21. $\dfrac{-1}{x^4}$	22. $\dfrac{2}{\sqrt{x}}$	23. $\dfrac{2}{3\sqrt[3]{x}}$	24. $\dfrac{3\sqrt{x}}{2}$
25. 3, 3	26. 0, 2, 4	27. 11, 2, –1 , 2, 11	28. $\dfrac{-1}{4}, \dfrac{-1}{4}, -1, -1$
29. 3, 0, 3	30. 4x + 5 (show work!)		

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