Math 151 Practice Sheet – The Power Rule

For each function, the best way to differentiate is to first rewrite the entire function, then differentiate using the power rule. So rewrite, then differentiate and simplify (eliminate any negative or fractional exponents) and check your answer on the back.

1) $y = \dfrac{5}{x^4} - \sqrt[5]{x^2} + 3x^3 + 14$

$y =$

$y' =$

2) $y = 14x^4 - \dfrac{3}{\sqrt{x}} + \dfrac{5}{\sqrt[4]{x}} - \dfrac{7\sqrt[3]{x}}{3} + 4x$

$y =$

$y' =$

3) $y = \sqrt{x^7} + \sqrt[3]{x^7} + \sqrt[4]{x^7} + \sqrt[5]{x^7} + \dfrac{11}{\sqrt[6]{x^7}}$

$y =$

$y' =$

4) $y = \dfrac{5}{x^3} - \dfrac{5x}{x^4} - \dfrac{2x+4}{x} - \dfrac{17}{\sqrt[9]{x}} + 2x^5 - 3$

$y =$

$y' =$

1) $y = \dfrac{5}{x^4} - \sqrt[5]{x^2} + 3x^3 + 14$

$y = 5x^{-4} - x^{2/5} + 3x^3 + 14$

$y' = -20x^{-5} - \dfrac{2}{5}x^{-3/5} + 9x^2 = -\dfrac{20}{x^5} - \dfrac{2}{5\sqrt[5]{x^3}} + 9x^2$

2) $y = 14x^4 - \dfrac{3}{\sqrt{x}} + \dfrac{5}{\sqrt[4]{x}} - \dfrac{7\sqrt[3]{x}}{3} + 4x$

$y = 14x^4 - 3x^{-1/2} + 5x^{-1/4} - \dfrac{7}{3}x^{1/3} + 4x$

$y' = 56x^3 + \dfrac{3}{2}x^{-3/2} - \dfrac{5}{4}x^{-5/4} - \dfrac{7}{9}x^{-2/3} + 4 = 56x^3 + \dfrac{3}{2\sqrt{x^3}} - \dfrac{5}{4\sqrt[4]{x^5}} - \dfrac{7}{9\sqrt[3]{x^2}} + 4$

3) $y = \sqrt{x^7} + \sqrt[3]{x^7} + \sqrt[4]{x^7} + \sqrt[5]{x^7} + \dfrac{11}{\sqrt[6]{x^7}}$

$y = x^{7/2} + x^{7/3} + x^{7/4} + x^{7/5} + 11x^{-7/6}$

$y' = \dfrac{7}{2}x^{5/2} + \dfrac{7}{3}x^{4/3} + \dfrac{7}{4}x^{3/4} + \dfrac{7}{5}x^{2/5} - \dfrac{77}{6}x^{-13/6} = \dfrac{7\sqrt{x^5}}{2} + \dfrac{7\sqrt[3]{x^4}}{3} + \dfrac{7\sqrt[4]{x^3}}{4} + \dfrac{7\sqrt[5]{x^2}}{5} - \dfrac{77}{6\sqrt[6]{x^{13}}}$

4) $y = \dfrac{5}{x^3} - \dfrac{5x}{x^4} - \dfrac{2x+4}{x} - \dfrac{17}{\sqrt[9]{x}} + 2x^5 - 3$

$y = 5x^{-3} - 5x^{-3} - 2 - 4x^{-1} - 17x^{-1/9} + 2x^5 - 3$

$y' = -15x^{-4} + 15x^{-4} + 4x^{-2} + \dfrac{17}{9}x^{-10/9} + 10x^4 = \dfrac{4}{x^2} + \dfrac{17}{9\sqrt[9]{x^{10}}} + 10x^4$