Calculus Practice: Higher Order Derivatives 1a

For each problem, find the indicated derivative with respect to *x*.

1) $y = x^4 + 4x^{-1} + \frac{4}{x^5}$ Find $\frac{d^3y}{dx^3}$

A) $\frac{d^3y}{dx^3} = 64x^4 - \frac{4}{x} - \frac{500}{x^5}$

B) $\frac{d^3y}{dx^3} = x^2 + \frac{4}{x^3} + \frac{4}{x^7}$

C) $\frac{d^3y}{dx^3} = -20x$

D) $\frac{d^3y}{dx^3} = 24x - \frac{24}{x^4} - \frac{840}{x^8}$

2) $y = 4\sqrt[3]{x} - 5x^{-2}$ Find $\frac{d^2y}{dx^2}$

A) $\frac{d^2y}{dx^2} = -\frac{8}{9x^{\frac{5}{3}}} - \frac{30}{x^4}$

B) $\frac{d^2y}{dx^2} = \frac{34x}{3}$

C) $\frac{d^2y}{dx^2} = \frac{4x^{\frac{1}{3}}}{81} - \frac{80}{x^2}$

D) $\frac{d^2y}{dx^2} = \frac{4}{x^{\frac{5}{3}}} - \frac{5}{x^4}$

3) $f(x) = 3x^4 - 4x^{\frac{1}{4}} - \frac{1}{x^4}$ Find $f^{(4)}$

A) $f^{(4)}(x) = 15x$

B) $f^{(4)}(x) = 3 - \frac{4}{x^{\frac{15}{4}}} - \frac{1}{x^8}$

C) $f^{(4)}(x) = 72 + \frac{231}{64x^{\frac{15}{4}}} - \frac{840}{x^8}$

D) $f^{(4)}(x) = 768x^4 - \frac{x^{\frac{1}{4}}}{64} - \frac{256}{x^4}$

4) $y = -4\sqrt[4]{x}$ Find $\frac{d^4y}{dx^4}$

A) $\frac{d^4y}{dx^4} = -\frac{4}{x^{\frac{11}{4}}}$

B) $\frac{d^4y}{dx^4} = -\frac{x^{\frac{1}{4}}}{4}$

C) $\frac{d^4y}{dx^4} = -x$

D) $\frac{d^4y}{dx^4} = \frac{231}{64x^{\frac{15}{4}}}$

5) $y = -3x^{\frac{1}{3}}$ Find $\frac{d^2y}{dx^2}$

A) $\frac{d^2y}{dx^2} = -\frac{x^{\frac{1}{3}}}{3}$

B) $\frac{d^2y}{dx^2} = -\frac{3}{x^{\frac{5}{3}}}$

C) $\frac{d^2y}{dx^2} = -x$

D) $\frac{d^2y}{dx^2} = \frac{2}{3x^{\frac{5}{3}}}$

6) $f(x) = 4x^{\frac{5}{3}} + x^{\frac{1}{4}} + \frac{2}{x}$ Find f'''

A) $f'''(x) = \frac{500x^{\frac{5}{3}}}{27} + \frac{x^{\frac{1}{4}}}{64} - \frac{2}{x}$

B) $f'''(x) = \frac{59x}{12}$

C) $f'''(x) = \frac{4}{x^{\frac{7}{3}}} + \frac{1}{x^{\frac{15}{4}}} + \frac{2}{x^5}$

D) $f'''(x) = -\frac{40}{27x^{\frac{4}{3}}} + \frac{21}{64x^{\frac{11}{4}}} - \frac{12}{x^4}$

7) $y = 3\sqrt[3]{x} + 4x^{-1} + 3x^{-5}$ Find $\frac{d^4y}{dx^4}$

A) $\frac{d^4y}{dx^4} = -\frac{80}{27x^{\frac{11}{3}}} + \frac{96}{x^5} + \frac{5040}{x^9}$

B) $\frac{d^4y}{dx^4} = \frac{3}{x^{\frac{5}{3}}} + \frac{4}{x^3} + \frac{3}{x^7}$

C) $\frac{d^4y}{dx^4} = -18x$

D) $\frac{d^4y}{dx^4} = \frac{x^{\frac{1}{3}}}{3} + \frac{4}{x} + \frac{75}{x^5}$

8) $f(x) = -x^5 + 3\sqrt[5]{x^2}$ Find f''

A) $f''(x) = -125x^5 + \frac{24x^{\frac{2}{5}}}{125}$

B) $f''(x) = -20x^3 - \frac{18}{25x^{\frac{8}{5}}}$

C) $f''(x) = -x + \frac{3}{x^{\frac{18}{5}}}$

D) $f''(x) = -\frac{19x}{5}$

9) $y = -5x^{-5}$ Find $\frac{d^4y}{dx^4}$

A) $\frac{d^4y}{dx^4} = \frac{625}{x^5}$

B) $\frac{d^4y}{dx^4} = 25x$

C) $\frac{d^4y}{dx^4} = -\frac{5}{x^8}$

D) $\frac{d^4y}{dx^4} = -\frac{8400}{x^9}$

10) $y = 5x^3 + 4x^{-4}$ Find $\frac{d^3y}{dx^3}$

A) $\frac{d^3y}{dx^3} = 30 - \frac{480}{x^7}$

B) $\frac{d^3y}{dx^3} = 405x^3 + \frac{1024}{x^4}$

C) $\frac{d^3y}{dx^3} = 5 + \frac{4}{x^7}$

D) $\frac{d^3y}{dx^3} = -x$

11) $f(x) = \frac{1}{x^4}$ Find f'''

A) $f'''(x) = -\frac{120}{x^7}$

B) $f'''(x) = -4x$

C) $f'''(x) = \frac{16}{x^4}$

D) $f'''(x) = \frac{1}{x^8}$

12) $f(x) = 2x^{\frac{4}{3}}$ Find f''

A) $f''(x) = \frac{8}{9x^{\frac{2}{3}}}$

B) $f''(x) = \frac{8x}{3}$

C) $f''(x) = \frac{2}{x^{\frac{5}{3}}}$

D) $f''(x) = \frac{512x^{\frac{4}{3}}}{81}$

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