Calculus Practice: Calculating Derivatives 3a

Differentiate each function with respect to *x*.

1) $y = -\frac{3}{4}x^{\frac{5}{3}}$

A) $\frac{dy}{dx} = -\frac{5}{4}x^{\frac{2}{3}} = -\frac{5x^{\frac{2}{3}}}{4}$

B) $\frac{dy}{dx} = -\frac{3}{4}x^{\frac{2}{3}} = -\frac{3x^{\frac{2}{3}}}{4}$

C) $\frac{dy}{dx} = -\frac{5}{4}x = -\frac{5x}{4}$

D) $\frac{dy}{dx} = -\frac{5}{4}x^{\frac{5}{3}} = -\frac{5x^{\frac{5}{3}}}{4}$

2) $y = 4x^{\frac{1}{5}}$

A) $\frac{dy}{dx} = \frac{4}{5}x^{-\frac{4}{5}} = \frac{4}{5x^{\frac{4}{5}}}$

B) $\frac{dy}{dx} = \frac{4}{5}x^{\frac{1}{5}} = \frac{4x^{\frac{1}{5}}}{5}$

C) $\frac{dy}{dx} = \frac{4}{5}x = \frac{4x}{5}$

D) $\frac{dy}{dx} = 4x^{-\frac{4}{5}} = \frac{4}{x^{\frac{4}{5}}}$

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

A) $\frac{dy}{dx} = 4x^{-\frac{1}{5}} - \frac{1}{2}x^{-\frac{3}{5}} - \frac{1}{4}x^{-\frac{2}{3}} = \frac{4}{x^{\frac{1}{5}}} - \frac{1}{2x^{\frac{3}{5}}} - \frac{1}{4x^{\frac{2}{3}}}$

B) $\frac{dy}{dx} = \frac{16}{5}x^{\frac{4}{5}} - \frac{1}{5}x^{\frac{2}{5}} - \frac{1}{12}x^{\frac{1}{3}} = \frac{16x^{\frac{4}{5}}}{5} - \frac{x^{\frac{2}{5}}}{5} - \frac{x^{\frac{1}{3}}}{12}$

C) $\frac{dy}{dx} = \frac{16}{5}x - \frac{1}{5}x - \frac{1}{12}x = \frac{16x}{5} - \frac{x}{5} - \frac{x}{12}$

D) $\frac{dy}{dx} = \frac{16}{5}x^{-\frac{1}{5}} - \frac{1}{5}x^{-\frac{3}{5}} - \frac{1}{12}x^{-\frac{2}{3}} = \frac{16}{5x^{\frac{1}{5}}} - \frac{1}{5x^{\frac{3}{5}}} - \frac{1}{12x^{\frac{2}{3}}}$

4) $y = -\frac{1}{2}\sqrt[4]{x}$

A) $\frac{dy}{dx} = -\frac{1}{8}x = -\frac{x}{8}$

B) $\frac{dy}{dx} = -\frac{1}{8}x^{-\frac{3}{4}} = -\frac{1}{8x^{\frac{3}{4}}}$

C) $\frac{dy}{dx} = -\frac{1}{2}x^{-\frac{3}{4}} = -\frac{1}{2x^{\frac{3}{4}}}$

D) $\frac{dy}{dx} = -\frac{1}{8}x^{\frac{1}{4}} = -\frac{x^{\frac{1}{4}}}{8}$

5) $f(x) = \frac{1}{5}x^{\frac{3}{2}} - \frac{4}{3}x^{\frac{3}{5}}$

A) $f'(x) = \frac{3}{10}x^{\frac{1}{2}} - \frac{4}{5}x^{-\frac{2}{5}}$

$= \frac{3x^{\frac{1}{2}}}{10} - \frac{4}{5x^{\frac{2}{5}}}$

B) $f'(x) = \frac{3}{10}x^{\frac{3}{2}} - \frac{4}{5}x^{\frac{3}{5}}$

$= \frac{3x^{\frac{3}{2}}}{10} - \frac{4x^{\frac{3}{5}}}{5}$

C) $f'(x) = \frac{3}{10}x - \frac{4}{5}x$

$= \frac{3x}{10} - \frac{4x}{5}$

D) $f'(x) = \frac{1}{5}x^{\frac{1}{2}} - \frac{4}{3}x^{-\frac{2}{5}}$

$= \frac{x^{\frac{1}{2}}}{5} - \frac{4}{3x^{\frac{2}{5}}}$

6) $y = -\frac{2}{5}x^{\frac{3}{2}} + \frac{5}{4}\sqrt[4]{x}$

A) $\frac{dy}{dx} = -\frac{3}{5}x + \frac{5}{16}x$

$= -\frac{3x}{5} + \frac{5x}{16}$

B) $\frac{dy}{dx} = -\frac{2}{5}x^{\frac{1}{2}} + \frac{5}{4}x^{-\frac{3}{4}}$

$= -\frac{2x^{\frac{1}{2}}}{5} + \frac{5}{4x^{\frac{3}{4}}}$

C) $\frac{dy}{dx} = -\frac{3}{5}x^{\frac{3}{2}} + \frac{5}{16}x^{\frac{1}{4}}$

$= -\frac{3x^{\frac{3}{2}}}{5} + \frac{5x^{\frac{1}{4}}}{16}$

D) $\frac{dy}{dx} = -\frac{3}{5}x^{\frac{1}{2}} + \frac{5}{16}x^{-\frac{3}{4}}$

$= -\frac{3x^{\frac{1}{2}}}{5} + \frac{5}{16x^{\frac{3}{4}}}$

7) $f(x) = 4x^{\frac{5}{2}} + 2x^{\frac{5}{4}}$

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

B) $f'(x) = 10x^{\frac{3}{2}} + \frac{5}{2}x^{\frac{1}{4}}$

$= 10x^{\frac{3}{2}} + \frac{5x^{\frac{1}{4}}}{2}$

C) $f'(x) = 10x + \frac{5}{2}x$

$= 10x + \frac{5x}{2}$

D) $f'(x) = 10x^{\frac{5}{2}} + \frac{5}{2}x^{\frac{5}{4}}$

$= 10x^{\frac{5}{2}} + \frac{5x^{\frac{5}{4}}}{2}$

8) $f(x) = 4x^{\frac{5}{2}}$

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

B) $f'(x) = 10x^{\frac{3}{2}}$

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A) $\frac{dy}{dx} = 4x^{-\frac{1}{5}} - \frac{1}{2}x^{-\frac{3}{5}} - \frac{1}{4}x^{-\frac{2}{3}} = \frac{4}{x^{\frac{1}{5}}} - \frac{1}{2x^{\frac{3}{5}}} - \frac{1}{4x^{\frac{2}{3}}}$

B) $\frac{dy}{dx} = \frac{16}{5}x^{\frac{4}{5}} - \frac{1}{5}x^{\frac{2}{5}} - \frac{1}{12}x^{\frac{1}{3}} = \frac{16x^{\frac{4}{5}}}{5} - \frac{x^{\frac{2}{5}}}{5} - \frac{x^{\frac{1}{3}}}{12}$

C) $\frac{dy}{dx} = \frac{16}{5}x - \frac{1}{5}x - \frac{1}{12}x = \frac{16x}{5} - \frac{x}{5} - \frac{x}{12}$

*D) $\frac{dy}{dx} = \frac{16}{5}x^{-\frac{1}{5}} - \frac{1}{5}x^{-\frac{3}{5}} - \frac{1}{12}x^{-\frac{2}{3}} = \frac{16}{5x^{\frac{1}{5}}} - \frac{1}{5x^{\frac{3}{5}}} - \frac{1}{12x^{\frac{2}{3}}}$

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A) $\frac{dy}{dx} = -\frac{1}{8}x = -\frac{x}{8}$

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*A) $f'(x) = \frac{3}{10}x^{\frac{1}{2}} - \frac{4}{5}x^{-\frac{2}{5}}$

$= \frac{3x^{\frac{1}{2}}}{10} - \frac{4}{5x^{\frac{2}{5}}}$

B) $f'(x) = \frac{3}{10}x^{\frac{3}{2}} - \frac{4}{5}x^{\frac{3}{5}}$

$= \frac{3x^{\frac{3}{2}}}{10} - \frac{4x^{\frac{3}{5}}}{5}$

C) $f'(x) = \frac{3}{10}x - \frac{4}{5}x$

$= \frac{3x}{10} - \frac{4x}{5}$

D) $f'(x) = \frac{1}{5}x^{\frac{1}{2}} - \frac{4}{3}x^{-\frac{2}{5}}$

$= \frac{x^{\frac{1}{2}}}{5} - \frac{4}{3x^{\frac{2}{5}}}$

6) $y = -\frac{2}{5}x^{\frac{3}{2}} + \frac{5}{4}\sqrt[4]{x}$

A) $\frac{dy}{dx} = -\frac{3}{5}x + \frac{5}{16}x$

$= -\frac{3x}{5} + \frac{5x}{16}$

B) $\frac{dy}{dx} = -\frac{2}{5}x^{\frac{1}{2}} + \frac{5}{4}x^{-\frac{3}{4}}$

$= -\frac{2x^{\frac{1}{2}}}{5} + \frac{5}{4x^{\frac{3}{4}}}$

C) $\frac{dy}{dx} = -\frac{3}{5}x^{\frac{3}{2}} + \frac{5}{16}x^{\frac{1}{4}}$

$= -\frac{3x^{\frac{3}{2}}}{5} + \frac{5x^{\frac{1}{4}}}{16}$

*D) $\frac{dy}{dx} = -\frac{3}{5}x^{\frac{1}{2}} + \frac{5}{16}x^{-\frac{3}{4}}$

$= -\frac{3x^{\frac{1}{2}}}{5} + \frac{5}{16x^{\frac{3}{4}}}$

7) $f(x) = 4x^{\frac{5}{2}} + 2x^{\frac{5}{4}}$

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

*B) $f'(x) = 10x^{\frac{3}{2}} + \frac{5}{2}x^{\frac{1}{4}}$

$= 10x^{\frac{3}{2}} + \frac{5x^{\frac{1}{4}}}{2}$

C) $f'(x) = 10x + \frac{5}{2}x$

$= 10x + \frac{5x}{2}$

D) $f'(x) = 10x^{\frac{5}{2}} + \frac{5}{2}x^{\frac{5}{4}}$

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