Name_____

Calculus Practice: Calculating Derivatives 3b

Differentiate each function with respect to x.

1) $f(x) = -\dfrac{4}{3}x^{\frac{5}{4}} + 5\sqrt[3]{x} + \dfrac{3}{4}\sqrt[5]{x}$

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

3) $f(x) = \dfrac{2}{3}x^{\frac{3}{2}} - \dfrac{3}{5}\sqrt[5]{x}$

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

5) $y = 2\sqrt[5]{x^2}$

6) $f(x) = 4\sqrt[3]{x}$

7) $y = -\dfrac{5}{3}x^{\frac{5}{3}} + x^{\frac{1}{5}}$

8) $f(x) = 3x^{\frac{5}{2}} + x^{\frac{3}{2}}$

9) $f(x) = \dfrac{5}{3}x^{\frac{4}{5}}$

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

Name_____

Calculus Practice: Calculating Derivatives 3b

Differentiate each function with respect to x.

1) $f(x) = -\dfrac{4}{3}x^{\frac{5}{4}} + 5\sqrt[3]{x} + \dfrac{3}{4}\sqrt[5]{x}$

$f'(x) = -\dfrac{5}{3}x^{\frac{1}{4}} + \dfrac{5}{3}x^{-\frac{2}{3}} + \dfrac{3}{20}x^{-\frac{4}{5}}$

$\quad\quad = -\dfrac{5x^{\frac{1}{4}}}{3} + \dfrac{5}{3x^{\frac{2}{3}}} + \dfrac{3}{20x^{\frac{4}{5}}}$

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

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

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

3) $f(x) = \dfrac{2}{3}x^{\frac{3}{2}} - \dfrac{3}{5}\sqrt[5]{x}$

$f'(x) = x^{\frac{1}{2}} - \dfrac{3}{25}x^{-\frac{4}{5}}$

$\quad\quad = x^{\frac{1}{2}} - \dfrac{3}{25x^{\frac{4}{5}}}$

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

$f'(x) = \dfrac{16}{3}x^{\frac{1}{3}} - \dfrac{5}{9}x^{-\frac{2}{3}}$

$\quad\quad = \dfrac{16x^{\frac{1}{3}}}{3} - \dfrac{5}{9x^{\frac{2}{3}}}$

5) $y = 2\sqrt[5]{x^2}$

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

$\quad\quad = \dfrac{4}{5x^{\frac{3}{5}}}$

6) $f(x) = 4\sqrt[3]{x}$

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

$\quad\quad = \dfrac{4}{3x^{\frac{2}{3}}}$

7) $y = -\dfrac{5}{3}x^{\frac{5}{3}} + x^{\frac{1}{5}}$

$\dfrac{dy}{dx} = -\dfrac{25}{9}x^{\frac{2}{3}} + \dfrac{1}{5}x^{-\frac{4}{5}}$

$\quad\quad = -\dfrac{25x^{\frac{2}{3}}}{9} + \dfrac{1}{5x^{\frac{4}{5}}}$

8) $f(x) = 3x^{\frac{5}{2}} + x^{\frac{3}{2}}$

$f'(x) = \dfrac{15}{2}x^{\frac{3}{2}} + \dfrac{3}{2}x^{\frac{1}{2}}$

$\quad\quad = \dfrac{15x^{\frac{3}{2}}}{2} + \dfrac{3x^{\frac{1}{2}}}{2}$

9) $f(x) = \dfrac{5}{3}x^{\frac{4}{5}}$

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

$\quad\quad = \dfrac{4}{3x^{\frac{1}{5}}}$

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

$\dfrac{dy}{dx} = \dfrac{5}{2}x^{\frac{3}{2}} - \dfrac{1}{5}x^{-\frac{3}{5}} + \dfrac{5}{9}x^{-\frac{2}{3}}$

$\quad\quad = \dfrac{5x^{\frac{3}{2}}}{2} - \dfrac{1}{5x^{\frac{3}{5}}} + \dfrac{5}{9x^{\frac{2}{3}}}$