

Assignment

Date _____ Period _____

Differentiate each function with respect to x .

$$1) y = \left((x^4 + 2)^{\frac{1}{3}} - 2 \right)^{\frac{1}{4}}$$

$$\begin{aligned} \text{A) } \frac{dy}{dx} &= \frac{1}{4} \left((x^4 + 2)^{\frac{1}{3}} - 2 \right)^{-\frac{3}{4}} \\ &= \frac{1}{4 \left((x^4 + 2)^{\frac{1}{3}} - 2 \right)^{\frac{3}{4}}} \end{aligned}$$

$$\begin{aligned} \text{B) } \frac{dy}{dx} &= \frac{1}{3} (x^4 + 2)^{-\frac{2}{3}} \cdot 4x^3 \\ &= \frac{4x^3}{3(x^4 + 2)^{\frac{2}{3}}} \end{aligned}$$

$$\begin{aligned} \text{C) } \frac{dy}{dx} &= \left((x^4 + 2)^{\frac{1}{3}} - 2 \right)^{-\frac{3}{4}} \cdot \frac{1}{3} (x^4 + 2)^{-\frac{2}{3}} \cdot 4x^3 \\ &= \frac{4x^3}{3 \left((x^4 + 2)^{\frac{1}{3}} - 2 \right)^{\frac{3}{4}} \cdot (x^4 + 2)^{\frac{2}{3}}} \end{aligned}$$

$$\begin{aligned} \text{D) } \frac{dy}{dx} &= \frac{1}{4} \left((x^4 + 2)^{\frac{1}{3}} - 2 \right)^{-\frac{3}{4}} \cdot \frac{1}{3} (x^4 + 2)^{-\frac{2}{3}} \cdot 4x^3 \\ &= \frac{x^3}{3 \left((x^4 + 2)^{\frac{1}{3}} - 2 \right)^{\frac{3}{4}} \cdot (x^4 + 2)^{\frac{2}{3}}} \end{aligned}$$

$$2) y = \left((x^4 + 1)^{\frac{1}{4}} - 5 \right)^{-2}$$

$$\begin{aligned} \text{A) } \frac{dy}{dx} &= -2 \left((x^4 + 1)^{\frac{1}{4}} - 5 \right)^{-3} \\ &= -\frac{2}{\left((x^4 + 1)^{\frac{1}{4}} - 5 \right)^3} \end{aligned}$$

$$\begin{aligned} \text{B) } \frac{dy}{dx} &= \left((x^4 + 1)^{\frac{1}{4}} - 5 \right)^{-3} \cdot \frac{1}{4} (x^4 + 1)^{-\frac{3}{4}} \cdot 4x^3 \\ &= \frac{x^3}{\left((x^4 + 1)^{\frac{1}{4}} - 5 \right)^3 \cdot (x^4 + 1)^{\frac{3}{4}}} \end{aligned}$$

$$\begin{aligned} \text{C) } \frac{dy}{dx} &= -2 \left((x^4 + 1)^{\frac{1}{4}} - 5 \right)^{-3} \cdot \frac{1}{4} (x^4 + 1)^{-\frac{3}{4}} \cdot 4x^3 \\ &= -\frac{2x^3}{\left((x^4 + 1)^{\frac{1}{4}} - 5 \right)^3 \cdot (x^4 + 1)^{\frac{3}{4}}} \end{aligned}$$

$$\begin{aligned} \text{D) } \frac{dy}{dx} &= \frac{1}{4} (x^4 + 1)^{-\frac{3}{4}} \cdot 4x^3 \\ &= \frac{x^3}{(x^4 + 1)^{\frac{3}{4}}} \end{aligned}$$

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

$$\begin{aligned} \text{A) } \frac{dy}{dx} &= \frac{1}{4}((5x^5 + 3)^{-5} - 2)^{-\frac{3}{4}} \cdot -5(5x^5 + 3)^{-6} \cdot 25x^4 \\ &= -\frac{125x^4}{4(-2(5x^5 + 3)^5 + 1)^{\frac{3}{4}} \cdot (5x^5 + 3)^{\frac{9}{4}}} \end{aligned}$$

$$\begin{aligned} \text{B) } \frac{dy}{dx} &= \frac{1}{4}((5x^5 + 3)^{-5} - 2)^{-\frac{3}{4}} \\ &= \frac{(5x^5 + 3)^{\frac{15}{4}}}{4(-2(5x^5 + 3)^5 + 1)^{\frac{3}{4}}} \end{aligned}$$

$$\begin{aligned} \text{C) } \frac{dy}{dx} &= -5(5x^5 + 3)^{-6} \cdot 25x^4 \\ &= -\frac{125x^4}{(5x^5 + 3)^6} \end{aligned}$$

$$\begin{aligned} \text{D) } \frac{dy}{dx} &= ((5x^5 + 3)^{-5} - 2)^{-\frac{3}{4}} \cdot -5(5x^5 + 3)^{-6} \cdot 25x^4 \\ &= -\frac{125x^4}{(-2(5x^5 + 3)^5 + 1)^{\frac{3}{4}} \cdot (5x^5 + 3)^{\frac{9}{4}}} \end{aligned}$$

For each problem, find the indicated derivative with respect to the given variable.

$$4) r = -4\sqrt[5]{x^2} + 5x^{\frac{1}{5}} + \frac{5}{x^2} \quad \text{Find } \frac{d^4 r}{dx^4}$$

$$\text{A) } \frac{d^4 r}{dx^4} = \frac{2496}{625x^{\frac{18}{5}}} - \frac{504}{125x^{\frac{19}{5}}} + \frac{600}{x^6}$$

$$\text{B) } \frac{d^4 r}{dx^4} = -\frac{64x^{\frac{2}{5}}}{625} + \frac{x^{\frac{1}{5}}}{125} + \frac{80}{x^2}$$

$$\text{C) } \frac{d^4 r}{dx^4} = -\frac{53x}{5}$$

$$\text{D) } \frac{d^4 r}{dx^4} = -4 \cdot \frac{1}{x^{\frac{18}{5}}} + 5 \cdot \frac{1}{x^{\frac{19}{5}}} + \frac{5}{x^6}$$

$$5) t = 4r^5 + r^2 + r^{\frac{1}{5}} \quad \text{Find } \frac{d^4 t}{dr^4}$$

$$\text{A) } \frac{d^4 t}{dr^4} = 2500r^5 + 16r^2 + \frac{r^{\frac{1}{5}}}{625}$$

$$\text{B) } \frac{d^4 t}{dr^4} = \frac{111r}{5}$$

$$\text{C) } \frac{d^4 t}{dr^4} = 4r - 8 + \frac{1}{r^{\frac{19}{5}}}$$

$$\text{D) } \frac{d^4 t}{dr^4} = 480r - \frac{504}{625r^{\frac{19}{5}}}$$

6) $h = 2\sqrt[4]{t} + 5t^{\frac{1}{5}} - t^{-3}$ Find $\frac{d^4h}{dt^4}$

A) $\frac{d^4h}{dt^4} = \frac{2}{\frac{15}{t^4}} + \frac{5}{\frac{19}{t^5}} - \frac{1}{t^7}$

B) $\frac{d^4h}{dt^4} = \frac{1}{128} + \frac{1}{125} - \frac{81}{t^3}$

C) $\frac{d^4h}{dt^4} = -\frac{231}{128t^{\frac{15}{4}}} - \frac{504}{125t^{\frac{19}{5}}} - \frac{360}{t^7}$

D) $\frac{d^4h}{dt^4} = \frac{9t}{2}$

For each problem, use implicit differentiation to find $\frac{d^2y}{dx^2}$ at the given point.

7) $y^2 + 3 = 4x^2$ at $(-1, 1)$

A) $\frac{d^2y}{dx^2} \Big|_{\substack{x=-1 \\ y=1}} = -2$

B) $\frac{d^2y}{dx^2} \Big|_{\substack{x=-1 \\ y=1}} = -\frac{3}{16}$

C) $\frac{d^2y}{dx^2} \Big|_{\substack{x=-1 \\ y=1}} = -12$

D) $\frac{d^2y}{dx^2} \Big|_{\substack{x=-1 \\ y=1}} = \frac{5}{2}$

8) $3x - 5y^2 = 1$ at $(2, 1)$

A) $\frac{d^2y}{dx^2} \Big|_{\substack{x=2 \\ y=1}} = -\frac{9}{100}$

B) $\frac{d^2y}{dx^2} \Big|_{\substack{x=2 \\ y=1}} = -7$

C) $\frac{d^2y}{dx^2} \Big|_{\substack{x=2 \\ y=1}} = 0$

D) $\frac{d^2y}{dx^2} \Big|_{\substack{x=2 \\ y=1}} = \frac{100}{9}$

9) $4 = 4x + 3y^2$ at $(-2, 2)$

A) $\frac{d^2y}{dx^2} \Big|_{\substack{x=-2 \\ y=2}} = -\frac{1}{18}$

B) $\frac{d^2y}{dx^2} \Big|_{\substack{x=-2 \\ y=2}} = 4$

C) $\frac{d^2y}{dx^2} \Big|_{\substack{x=-2 \\ y=2}} = -4$

D) $\frac{d^2y}{dx^2} \Big|_{\substack{x=-2 \\ y=2}} = \frac{9}{2}$

For each problem, find $(f^{-1})'(a)$

10) $f(x) = 5x^3 + 2x + 4, a = 11$

A) $(f^{-1})'(a) = \frac{1}{16}$

B) $(f^{-1})'(a) = \frac{1}{22}$

C) $(f^{-1})'(a) = \frac{1}{14}$

D) $(f^{-1})'(a) = \frac{1}{17}$

11) $f(x) = 4x^7 + 5x + 5, a = 5$

A) $(f^{-1})'(a) = \frac{1}{3}$

B) $(f^{-1})'(a) = \frac{1}{5}$

C) $(f^{-1})'(a) = \frac{1}{9}$

D) $(f^{-1})'(a) = -\frac{1}{6}$

12) $f(x) = 3x^7 + x + 4, a = 4$

A) $(f^{-1})'(a) = -1$

B) $(f^{-1})'(a) = 1$

C) $(f^{-1})'(a) = \frac{1}{7}$

D) $(f^{-1})'(a) = -\frac{1}{6}$

Differentiate each function with respect to the given variable.

$$13) r = \sqrt[5]{\tan^{-1} 3t^2}$$

$$\begin{aligned} \text{A) } \frac{dr}{dt} &= \frac{1}{5} \cdot (\tan^{-1} 3t^2)^{\frac{1}{5}-1} \cdot \frac{1}{(3t^2)^2 + 1} \cdot 6t \\ &= \frac{6t \sqrt[5]{\tan^{-1} 3t^2}}{5(9t^4 + 1)} \end{aligned}$$

$$\begin{aligned} \text{B) } \frac{dr}{dt} &= (\tan^{-1} 3t^2)^{-\frac{4}{5}} \cdot \frac{1}{(3t^2)^2 + 1} \cdot 6t \\ &= \frac{6t}{\sqrt[5]{(\tan^{-1} 3t^2)^4 (9t^4 + 1)}} \end{aligned}$$

$$\begin{aligned} \text{C) } \frac{dr}{dt} &= \frac{1}{5} \cdot (\tan^{-1} 3t^2)^{-\frac{4}{5}} \cdot \frac{1}{(3t^2)^2 + 1} \cdot 6t \\ &= \frac{6t}{5 \sqrt[5]{(\tan^{-1} 3t^2)^4 (9t^4 + 1)}} \end{aligned}$$

$$\begin{aligned} \text{D) } \frac{dr}{dt} &= \frac{1}{5} \cdot \frac{1}{(3t^2)^2 + 1} \cdot 6t \tan^{-1} 3t^2 \\ &= \frac{6t \tan^{-1} 3t^2}{5(9t^4 + 1)} \end{aligned}$$

$$14) g = \csc^{-1} \sqrt[3]{3s^3 + 4}$$

$$\begin{aligned} \text{A) } \frac{dg}{ds} &= -\frac{1}{\left| (3s^3 + 4)^{\frac{1}{3}} \right| \sqrt{\left((3s^3 + 4)^{\frac{1}{3}} \right)^2 - 1}} \cdot \frac{1}{3} (3s^3 + 4)^{-\frac{2}{3}} \cdot 9s^2 \\ &= -\frac{1}{\left| \sqrt[3]{3s^3 + 4} \right| \sqrt{\sqrt[3]{(3s^3 + 4)^2} - 1} \cdot \sqrt[3]{(3s^3 + 4)^2}} \end{aligned}$$

$$\begin{aligned} \text{B) } \frac{dg}{ds} &= -\frac{1}{\left| (3s^3 + 4)^{\frac{1}{3}} \right| \sqrt{(3s^3 + 4)^{\frac{1}{3}} - 1}} \cdot \frac{1}{3} (3s^3 + 4)^{-\frac{2}{3}} \cdot 9s^2 \\ &= -\frac{1}{\left| \sqrt[3]{3s^3 + 4} \right| \sqrt{\sqrt[3]{3s^3 + 4} - 1} \cdot \sqrt[3]{(3s^3 + 4)^2}} \end{aligned}$$

$$\begin{aligned} \text{C) } \frac{dg}{ds} &= -\csc^{-1} (3s^3 + 4)^{\frac{1}{3}} \tan (3s^3 + 4)^{\frac{1}{3}} \cdot \frac{1}{3} (3s^3 + 4)^{-\frac{2}{3}} \cdot 9s^2 \\ &= -\frac{3s^2 \csc^{-1} \sqrt[3]{3s^3 + 4} \cdot \tan \sqrt[3]{3s^3 + 4}}{\sqrt[3]{(3s^3 + 4)^2}} \end{aligned}$$

$$\begin{aligned} \text{D) } \frac{dg}{ds} &= -\frac{1}{\left| (3s^3 + 4)^{\frac{1}{3}} \left| \left((3s^3 + 4)^{\frac{1}{3}} \right)^2 - 1 \right| \right|} \cdot \frac{1}{3} (3s^3 + 4)^{-\frac{2}{3}} \cdot 9s^2 \\ &= -\frac{1}{\left| \sqrt[3]{3s^3 + 4} \right| \sqrt[3]{(3s^3 + 4)^2} \left(\sqrt[3]{(3s^3 + 4)^2} - 1 \right)} \end{aligned}$$

$$15) h = (\sec^{-1} -x^4)^5$$

$$\begin{aligned} \text{A) } \frac{dh}{dx} &= (\sec^{-1} -x^4)^4 \cdot \frac{1}{\left| -x^4 \right| \sqrt{(-x^4)^2 - 1}} \cdot -4x^3 \\ &= -\frac{4x^3 (\sec^{-1} -x^4)^4}{\left| -x^4 \right| \sqrt{x^8 - 1}} \end{aligned}$$

$$\begin{aligned} \text{B) } \frac{dh}{dx} &= 5(\sec^{-1} -x^4)^4 \cdot \frac{1}{\left| -x^4 \right| \sqrt{(-x^4)^2 - 1}} \cdot -4x^3 \\ &= -\frac{20x^3 (\sec^{-1} -x^4)^4}{\left| -x^4 \right| \sqrt{x^8 - 1}} \end{aligned}$$

$$\begin{aligned} \text{C) } \frac{dh}{dx} &= 5 \cdot \frac{1}{\left| -x^4 \right| \sqrt{(-x^4)^2 - 1}} \cdot -4x^3 \sec^{-1} -x^4 \\ &= -\frac{20x^3 \sec^{-1} -x^4}{\left| -x^4 \right| \sqrt{x^8 - 1}} \end{aligned}$$

$$\begin{aligned} \text{D) } \frac{dh}{dx} &= 5(\sec^{-1} -x^4)^5 \cdot \frac{1}{\left| -x^4 \right| \sqrt{(-x^4)^2 - 1}} \cdot -4x^3 \\ &= -\frac{20x^3 (\sec^{-1} -x^4)^5}{\left| -x^4 \right| \sqrt{x^8 - 1}} \end{aligned}$$

Differentiate each function with respect to x . Problems may contain constants a , b , and c .

$$16) y = bx^{\frac{4}{3}} - 3a + 5$$

$$A) \frac{dy}{dx} = \frac{4bx^{\frac{1}{3}}}{3}$$

$$B) \frac{dy}{dx} = bx^{\frac{1}{3}} + 3$$

$$C) \frac{dy}{dx} = \frac{4bx}{3} - 11$$

$$D) \frac{dy}{dx} = \frac{4bx^{\frac{4}{3}}}{3} - 12$$

$$17) y = -\frac{3}{4}x^5 + 2cx^{\frac{1}{3}} + \frac{3}{5}$$

$$A) \frac{dy}{dx} = -\frac{15x^5}{4} + \frac{2cx^{\frac{1}{3}}}{3} - 6$$

$$B) \frac{dy}{dx} = \frac{2cx}{3} - \frac{15x}{4} - 1$$

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

$$D) \frac{dy}{dx} = -\frac{15x^4}{4} + \frac{2c}{3x^3}$$

$$18) y = 3bx^5 - \frac{1}{5}x^{\frac{1}{4}} - bx^{-2}$$

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

$$B) \frac{dy}{dx} = 17bx - \frac{x}{20}$$

$$C) \frac{dy}{dx} = 15bx^4 - \frac{1}{20x^{\frac{3}{4}}} + \frac{2b}{x^3}$$

$$D) \frac{dy}{dx} = 15bx^5 - \frac{x^{\frac{1}{4}}}{20} + \frac{2b}{x^2}$$

Differentiate each function with respect to the given variable.

$$19) f = \left(t^{\frac{4}{5}} + 2\right)(4t^5 + 5)$$

$$A) \frac{df}{dt} = \frac{116t^{\frac{24}{5}}}{5} + 40t^4 + \frac{4}{t^{\frac{1}{5}}}$$

$$B) \frac{df}{dt} = t^{\frac{4}{5}} + 2 + \frac{4}{5t^{\frac{1}{5}}}$$

$$C) \frac{df}{dt} = 20t^{\frac{24}{5}} + 40t^4$$

$$D) \frac{df}{dt} = 4t^{\frac{29}{5}} + 8t^5 + 16t^{\frac{19}{5}} + 5t^{\frac{4}{5}} + 10$$

$$20) h = \left(-3 + \frac{1}{r^3}\right)(2r^5 + 2)$$

$$A) \frac{dh}{dr} = -6r^5 + 2r^2 - 36 + \frac{2}{r^3}$$

$$B) \frac{dh}{dr} = -3 + \frac{1}{r^3} - \frac{3}{r^4}$$

$$C) \frac{dh}{dr} = -30r^4 + 4r - \frac{6}{r^4}$$

$$D) \frac{dh}{dr} = 2r^5 + 10r^4 + 2$$

$$21) y = \left(4 + \frac{1}{r^4}\right)(r^5 + 1)$$

$$A) \frac{dy}{dr} = -4 - \frac{4}{r^5}$$

$$B) \frac{dy}{dr} = 20r^4 + 1 - \frac{4}{r^5}$$

$$C) \frac{dy}{dr} = 4 + \frac{1}{r^4} - \frac{4}{r^5}$$

$$D) \frac{dy}{dr} = 4r^5 + r + 4 - \frac{20}{r} + \frac{1}{r^4}$$

$$22) t = \frac{5s^4 - 4s^2}{4s^{\frac{2}{5}} + 2}$$

$$A) \frac{dt}{ds} = 72s^{\frac{17}{5}} + 40s^3 - \frac{128s^{\frac{7}{5}}}{5} - 16s$$

$$B) \frac{dt}{ds} = \frac{90s^{\frac{17}{5}} + 50s^3 - 32s^{\frac{7}{5}} - 20s}{20s^{\frac{4}{5}} + 20s^{\frac{2}{5}} + 5}$$

$$C) \frac{dt}{ds} = \frac{360s^{\frac{12}{5}} + 200s^2 - 128s^{\frac{2}{5}} - 80}{125s^7 - 200s^5 + 80s^3}$$

$$D) \frac{dt}{ds} = \frac{180s^{\frac{17}{5}} + 100s^3 - 64s^{\frac{7}{5}} - 40s}{10s^{\frac{2}{5}} + 5}$$

$$23) f = \frac{4t^3 - t^2}{4\sqrt[3]{t} - 2}$$

$$A) \frac{df}{dt} = \frac{128t^{\frac{4}{3}} - 72t - 20t^{\frac{1}{3}} + 12}{48t^{\frac{8}{3}} - 24t^{\frac{5}{3}} + 3t^3}$$

$$B) \frac{df}{dt} = \frac{18t^{\frac{8}{3}} - 3t^{\frac{5}{3}} - 2}{24t^{\frac{4}{3}} - 24t + 6t^{\frac{2}{3}}}$$

$$C) \frac{df}{dt} = \frac{32t^{\frac{7}{3}} - 18t^2 - 5t^{\frac{4}{3}} + 3t}{12t^{\frac{2}{3}} - 12t^{\frac{1}{3}} + 3}$$

$$D) \frac{df}{dt} = \frac{64t^{\frac{7}{3}} - 36t^2 - 10t^{\frac{4}{3}} + 6t}{6t^{\frac{1}{3}} - 3}$$

$$24) f = \frac{4r^5 - 4r^3 - r^2}{2 + 3r^{-3}}$$

$$A) \frac{df}{dr} = \frac{20r^{10} - 12r^8 - 2r^7 + 9r^2}{4r^6 + 12r^3 + 9}$$

$$B) \frac{df}{dr} = \frac{40r^{10} - 24r^8 + 92r^7 - 72r^5 - 15r^4}{4r^6 + 12r^3 + 9}$$

$$C) \frac{df}{dr} = 40r^4 - 24r^2 + 92r - \frac{72}{r} - \frac{15}{r^2}$$

$$D) \frac{df}{dr} = \frac{40r^6 - 24r^4 + 92r^3 - 72r - 15}{16r^{12} - 32r^{10} - 8r^9 + 16r^8 + 8r^7 + r^6}$$

For each problem, you are given a table containing some values of differentiable functions $f(x)$, $g(x)$ and their derivatives. Use the table data and the rules of differentiation to solve each problem.

x	$f(x)$	$f'(x)$	$g(x)$	$g'(x)$
1	2	-1	3	-2
2	1	$\frac{1}{2}$	1	$-\frac{1}{2}$
3	3	2	2	1

$$A) h_1'(2) = 2$$

$$B) h_1'(2) = 1$$

$$C) h_1'(2) = 0$$

$$D) h_1'(2) = 3$$

$$h_2'(1) = -\frac{26}{9}$$

$$h_2'(1) = -\frac{8}{9}$$

$$h_2'(1) = \frac{1}{9}$$

$$h_2'(1) = -\frac{8}{9}$$

$$h_3'(1) = -6$$

$$h_3'(1) = -4$$

$$h_3'(1) = -4$$

$$h_3'(1) = -4$$

$$h_4'(1) = -1$$

$$h_4'(1) = -2$$

$$h_4'(1) = -4$$

$$h_4'(1) = -3$$

Part 1) Given $h_1(x) = f(x) \cdot g(x)$, find $h_1'(2)$

Part 2) Given $h_2(x) = \frac{f(x)}{g(x)}$, find $h_2'(1)$

Part 3) Given $h_3(x) = (f(x))^2$, find $h_3'(1)$

Part 4) Given $h_4(x) = f(g(x))$, find $h_4'(1)$

26)

x	$f(x)$	$f'(x)$	$g(x)$	$g'(x)$
1	1	2	2	1
2	3	0	3	$-\frac{1}{2}$
3	1	-2	1	-2

- A) $h_1'(1) = 8$
 $h_2'(3) = 0$
 $h_3'(1) = 4$
 $h_4'(3) = -1$
- B) $h_1'(1) = 7$
 $h_2'(3) = -1$
 $h_3'(1) = 3$
 $h_4'(3) = -6$

Part 1) Given $h_1(x) = f(x) \cdot g(x)$, find $h_1'(1)$

Part 2) Given $h_2(x) = \frac{f(x)}{g(x)}$, find $h_2'(3)$

Part 3) Given $h_3(x) = (f(x))^2$, find $h_3'(1)$

Part 4) Given $h_4(x) = f(g(x))$, find $h_4'(3)$

- C) $h_1'(1) = 5$
 $h_2'(3) = 0$
 $h_3'(1) = 4$
 $h_4'(3) = -4$
- D) $h_1'(1) = 8$
 $h_2'(3) = -2$
 $h_3'(1) = 7$
 $h_4'(3) = -3$

27)

x	$f(x)$	$f'(x)$	$g(x)$	$g'(x)$
1	2	-1	1	2
2	1	0	3	0
3	2	1	1	-2

- A) $h_1'(3) = -2$
 $h_2'(3) = 4$
 $h_3'(3) = 4$
 $h_4'(1) = -1$
- B) $h_1'(3) = -3$
 $h_2'(3) = 5$
 $h_3'(3) = 4$
 $h_4'(1) = -2$

Part 1) Given $h_1(x) = f(x) \cdot g(x)$, find $h_1'(3)$

Part 2) Given $h_2(x) = \frac{f(x)}{g(x)}$, find $h_2'(3)$

Part 3) Given $h_3(x) = (f(x))^2$, find $h_3'(3)$

Part 4) Given $h_4(x) = f(g(x))$, find $h_4'(1)$

- C) $h_1'(3) = -2$
 $h_2'(3) = 5$
 $h_3'(3) = 2$
 $h_4'(1) = -1$
- D) $h_1'(3) = -4$
 $h_2'(3) = 3$
 $h_3'(3) = 5$
 $h_4'(1) = -1$

Differentiate each function with respect to x .

28) $y = \frac{\sec x^3}{(2x^4 + 1)^2}$

A) $\frac{dy}{dx} = \frac{x^2 \sec x^3 \cdot (6x^4 \tan x^3 + 3 \tan x^3 - 16x)}{2x^4 + 1}$

B) $\frac{dy}{dx} = \frac{x^2(2x^4 + 1)(6x^4 \tan x^3 + 3 \tan x^3 - 16x)}{\sec x^3}$

C) $\frac{dy}{dx} = \frac{x^2 \sec x^3 \cdot (6x^4 \tan x^3 + 3 \tan x^3 - 16x)}{(2x^4 + 1)^3}$

D) $\frac{dy}{dx} = x^2 \sec x^3 \cdot (2x^4 + 1)(6x^4 \tan x^3 + 3 \tan x^3 - 16x)$

$$29) y = \frac{\csc 3x^5}{-4x^3 + 3}$$

$$A) \frac{dy}{dx} = \frac{3x^2 \csc 3x^5 \cdot (20x^5 \cot 3x^5 - 15x^2 \cot 3x^5 + 4)}{-4x^3 + 3}$$

$$B) \frac{dy}{dx} = \frac{3x^2 \csc 3x^5 \cdot (20x^5 \cot 3x^5 - 15x^2 \cot 3x^5 + 4)}{(-4x^3 + 3)^2}$$

$$C) \frac{dy}{dx} = \frac{3x^2(20x^5 \cot 3x^5 - 15x^2 \cot 3x^5 + 4)}{\csc 3x^5}$$

$$D) \frac{dy}{dx} = 3x^2 \csc 3x^5 \cdot (20x^5 \cot 3x^5 - 15x^2 \cot 3x^5 + 4)$$

$$30) y = \csc x^2 \cdot (3x^4 - 2)$$

$$A) \frac{dy}{dx} = 2x(-\csc x^2 \cot x^2 + 6x^2)$$

$$B) \frac{dy}{dx} = 12x^3 \csc x^2$$

$$C) \frac{dy}{dx} = -48x^4 \csc x^2 \cot x^2$$

$$D) \frac{dy}{dx} = 2x \csc x^2 \cdot (6x^2 - 3x^4 \cot x^2 + 2 \cot x^2)$$

Answers to Assignment (ID: 1)

1) D
5) D
9) A
13) C
17) D
21) B
25) C
29) B

2) C
6) C
10) D
14) A
18) C
22) B
26) C
30) D

3) A
7) C
11) B
15) B
19) A
23) C
27) B

4) A
8) A
12) B
16) A
20) C
24) B
28) C

Assignment

Date _____ Period _____

Differentiate each function with respect to x .

$$1) y = \left((x^4 + 2)^{\frac{1}{3}} - 2 \right)^{\frac{1}{4}}$$

$$\begin{aligned} \text{A) } \frac{dy}{dx} &= \frac{1}{4} \left((x^4 + 2)^{\frac{1}{3}} - 2 \right)^{-\frac{3}{4}} \\ &= \frac{1}{4 \left((x^4 + 2)^{\frac{1}{3}} - 2 \right)^{\frac{3}{4}}} \end{aligned}$$

$$\begin{aligned} \text{B) } \frac{dy}{dx} &= \frac{1}{3} (x^4 + 2)^{-\frac{2}{3}} \cdot 4x^3 \\ &= \frac{4x^3}{3(x^4 + 2)^{\frac{2}{3}}} \end{aligned}$$

$$\begin{aligned} \text{C) } \frac{dy}{dx} &= \left((x^4 + 2)^{\frac{1}{3}} - 2 \right)^{-\frac{3}{4}} \cdot \frac{1}{3} (x^4 + 2)^{-\frac{2}{3}} \cdot 4x^3 \\ &= \frac{4x^3}{3 \left((x^4 + 2)^{\frac{1}{3}} - 2 \right)^{\frac{3}{4}} \cdot (x^4 + 2)^{\frac{2}{3}}} \end{aligned}$$

$$\begin{aligned} \text{D) } \frac{dy}{dx} &= \frac{1}{4} \left((x^4 + 2)^{\frac{1}{3}} - 2 \right)^{-\frac{3}{4}} \cdot \frac{1}{3} (x^4 + 2)^{-\frac{2}{3}} \cdot 4x^3 \\ &= \frac{x^3}{3 \left((x^4 + 2)^{\frac{1}{3}} - 2 \right)^{\frac{3}{4}} \cdot (x^4 + 2)^{\frac{2}{3}}} \end{aligned}$$

$$2) y = \left((x^4 + 1)^{\frac{1}{4}} - 5 \right)^{-2}$$

$$\begin{aligned} \text{A) } \frac{dy}{dx} &= -2 \left((x^4 + 1)^{\frac{1}{4}} - 5 \right)^{-3} \\ &= -\frac{2}{\left((x^4 + 1)^{\frac{1}{4}} - 5 \right)^3} \end{aligned}$$

$$\begin{aligned} \text{B) } \frac{dy}{dx} &= \left((x^4 + 1)^{\frac{1}{4}} - 5 \right)^{-3} \cdot \frac{1}{4} (x^4 + 1)^{-\frac{3}{4}} \cdot 4x^3 \\ &= \frac{x^3}{\left((x^4 + 1)^{\frac{1}{4}} - 5 \right)^3 \cdot (x^4 + 1)^{\frac{3}{4}}} \end{aligned}$$

$$\begin{aligned} \text{C) } \frac{dy}{dx} &= -2 \left((x^4 + 1)^{\frac{1}{4}} - 5 \right)^{-3} \cdot \frac{1}{4} (x^4 + 1)^{-\frac{3}{4}} \cdot 4x^3 \\ &= -\frac{2x^3}{\left((x^4 + 1)^{\frac{1}{4}} - 5 \right)^3 \cdot (x^4 + 1)^{\frac{3}{4}}} \end{aligned}$$

$$\begin{aligned} \text{D) } \frac{dy}{dx} &= \frac{1}{4} (x^4 + 1)^{-\frac{3}{4}} \cdot 4x^3 \\ &= \frac{x^3}{(x^4 + 1)^{\frac{3}{4}}} \end{aligned}$$

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

$$\begin{aligned} \text{A) } \frac{dy}{dx} &= \frac{1}{4}((5x^5 + 3)^{-5} - 2)^{-\frac{3}{4}} \cdot -5(5x^5 + 3)^{-6} \cdot 25x^4 \\ &= -\frac{125x^4}{4(-2(5x^5 + 3)^5 + 1)^{\frac{3}{4}} \cdot (5x^5 + 3)^{\frac{9}{4}}} \end{aligned}$$

$$\begin{aligned} \text{B) } \frac{dy}{dx} &= \frac{1}{4}((5x^5 + 3)^{-5} - 2)^{-\frac{3}{4}} \\ &= \frac{(5x^5 + 3)^{\frac{15}{4}}}{4(-2(5x^5 + 3)^5 + 1)^{\frac{3}{4}}} \end{aligned}$$

$$\begin{aligned} \text{C) } \frac{dy}{dx} &= -5(5x^5 + 3)^{-6} \cdot 25x^4 \\ &= -\frac{125x^4}{(5x^5 + 3)^6} \end{aligned}$$

$$\begin{aligned} \text{D) } \frac{dy}{dx} &= ((5x^5 + 3)^{-5} - 2)^{-\frac{3}{4}} \cdot -5(5x^5 + 3)^{-6} \cdot 25x^4 \\ &= -\frac{125x^4}{(-2(5x^5 + 3)^5 + 1)^{\frac{3}{4}} \cdot (5x^5 + 3)^{\frac{9}{4}}} \end{aligned}$$

For each problem, find the indicated derivative with respect to the given variable.

$$4) r = -4\sqrt[5]{x^2} + 5x^{\frac{1}{5}} + \frac{5}{x^2} \quad \text{Find } \frac{d^4 r}{dx^4}$$

$$\text{A) } \frac{d^4 r}{dx^4} = \frac{2496}{625x^{\frac{18}{5}}} - \frac{504}{125x^{\frac{19}{5}}} + \frac{600}{x^6}$$

$$\text{B) } \frac{d^4 r}{dx^4} = -\frac{64x^{\frac{2}{5}}}{625} + \frac{x^{\frac{1}{5}}}{125} + \frac{80}{x^2}$$

$$\text{C) } \frac{d^4 r}{dx^4} = -\frac{53x}{5}$$

$$\text{D) } \frac{d^4 r}{dx^4} = -4 \cdot \frac{1}{x^{\frac{18}{5}}} + 5 \cdot \frac{1}{x^{\frac{19}{5}}} + \frac{5}{x^6}$$

$$5) t = 4r^5 + r^2 + r^{\frac{1}{5}} \quad \text{Find } \frac{d^4 t}{dr^4}$$

$$\text{A) } \frac{d^4 t}{dr^4} = 2500r^5 + 16r^2 + \frac{r^{\frac{1}{5}}}{625}$$

$$\text{B) } \frac{d^4 t}{dr^4} = \frac{111r}{5}$$

$$\text{C) } \frac{d^4 t}{dr^4} = 4r - 8 + \frac{1}{r^5}$$

$$\text{D) } \frac{d^4 t}{dr^4} = 480r - \frac{504}{625r^5}$$

6) $h = 2\sqrt[4]{t} + 5t^{\frac{1}{5}} - t^{-3}$ Find $\frac{d^4h}{dt^4}$

A) $\frac{d^4h}{dt^4} = \frac{2}{t^{\frac{15}{4}}} + \frac{5}{t^{\frac{19}{5}}} - \frac{1}{t^7}$

B) $\frac{d^4h}{dt^4} = \frac{1}{128t^{\frac{1}{4}}} + \frac{1}{125t^{\frac{1}{5}}} - \frac{81}{t^3}$

C) $\frac{d^4h}{dt^4} = -\frac{231}{128t^{\frac{15}{4}}} - \frac{504}{125t^{\frac{19}{5}}} - \frac{360}{t^7}$

D) $\frac{d^4h}{dt^4} = \frac{9t}{2}$

For each problem, use implicit differentiation to find $\frac{d^2y}{dx^2}$ at the given point.

7) $y^2 + 3 = 4x^2$ at $(-1, 1)$

A) $\left. \frac{d^2y}{dx^2} \right|_{\substack{x=-1 \\ y=1}} = -2$

B) $\left. \frac{d^2y}{dx^2} \right|_{\substack{x=-1 \\ y=1}} = -\frac{3}{16}$

C) $\left. \frac{d^2y}{dx^2} \right|_{\substack{x=-1 \\ y=1}} = -12$

D) $\left. \frac{d^2y}{dx^2} \right|_{\substack{x=-1 \\ y=1}} = \frac{5}{2}$

8) $3x - 5y^2 = 1$ at $(2, 1)$

A) $\left. \frac{d^2y}{dx^2} \right|_{\substack{x=2 \\ y=1}} = -\frac{9}{100}$

B) $\left. \frac{d^2y}{dx^2} \right|_{\substack{x=2 \\ y=1}} = -7$

C) $\left. \frac{d^2y}{dx^2} \right|_{\substack{x=2 \\ y=1}} = 0$

D) $\left. \frac{d^2y}{dx^2} \right|_{\substack{x=2 \\ y=1}} = \frac{100}{9}$

9) $4 = 4x + 3y^2$ at $(-2, 2)$

A) $\left. \frac{d^2y}{dx^2} \right|_{\substack{x=-2 \\ y=2}} = -\frac{1}{18}$

B) $\left. \frac{d^2y}{dx^2} \right|_{\substack{x=-2 \\ y=2}} = 4$

C) $\left. \frac{d^2y}{dx^2} \right|_{\substack{x=-2 \\ y=2}} = -4$

D) $\left. \frac{d^2y}{dx^2} \right|_{\substack{x=-2 \\ y=2}} = \frac{9}{2}$

For each problem, find $(f^{-1})'(a)$

10) $f(x) = 4x^7 + 5x + 5, a = 5$

A) $(f^{-1})'(a) = \frac{1}{3}$

B) $(f^{-1})'(a) = \frac{1}{5}$

C) $(f^{-1})'(a) = \frac{1}{9}$

D) $(f^{-1})'(a) = -\frac{1}{6}$

11) $f(x) = 5x^3 + 2x + 4, a = 11$

A) $(f^{-1})'(a) = \frac{1}{16}$

B) $(f^{-1})'(a) = \frac{1}{22}$

C) $(f^{-1})'(a) = \frac{1}{14}$

D) $(f^{-1})'(a) = \frac{1}{17}$

12) $f(x) = 3x^7 + x + 4, a = 4$

A) $(f^{-1})'(a) = -1$

B) $(f^{-1})'(a) = 1$

C) $(f^{-1})'(a) = \frac{1}{7}$

D) $(f^{-1})'(a) = -\frac{1}{6}$

Differentiate each function with respect to the given variable.

$$13) h = (\sec^{-1} -x^4)^5$$

$$\begin{aligned} \text{A) } \frac{dh}{dx} &= (\sec^{-1} -x^4)^4 \cdot \frac{1}{|-x^4| \sqrt{(-x^4)^2 - 1}} \cdot -4x^3 \\ &= -\frac{4x^3(\sec^{-1} -x^4)^4}{|-x^4| \sqrt{x^8 - 1}} \end{aligned}$$

$$\begin{aligned} \text{B) } \frac{dh}{dx} &= 5(\sec^{-1} -x^4)^4 \cdot \frac{1}{|-x^4| \sqrt{(-x^4)^2 - 1}} \cdot -4x^3 \\ &= -\frac{20x^3(\sec^{-1} -x^4)^4}{|-x^4| \sqrt{x^8 - 1}} \end{aligned}$$

$$\begin{aligned} \text{C) } \frac{dh}{dx} &= 5 \cdot \frac{1}{|-x^4| \sqrt{(-x^4)^2 - 1}} \cdot -4x^3 \sec^{-1} -x^4 \\ &= -\frac{20x^3 \sec^{-1} -x^4}{|-x^4| \sqrt{x^8 - 1}} \end{aligned}$$

$$\begin{aligned} \text{D) } \frac{dh}{dx} &= 5(\sec^{-1} -x^4)^5 \cdot \frac{1}{|-x^4| \sqrt{(-x^4)^2 - 1}} \cdot -4x^3 \\ &= -\frac{20x^3(\sec^{-1} -x^4)^5}{|-x^4| \sqrt{x^8 - 1}} \end{aligned}$$

$$14) g = \csc^{-1} \sqrt[3]{3s^3 + 4}$$

$$A) \frac{dg}{ds} = -\frac{1}{\left| (3s^3 + 4)^{\frac{1}{3}} \right| \sqrt{\left((3s^3 + 4)^{\frac{1}{3}} \right)^2 - 1}} \cdot \frac{1}{3} (3s^3 + 4)^{-\frac{2}{3}} \cdot 9s^2$$

$$= -\frac{1}{3s^2 \sqrt{\left(\sqrt[3]{3s^3 + 4} \right)^2 - 1} \cdot \sqrt[3]{(3s^3 + 4)^2}}$$

$$B) \frac{dg}{ds} = -\frac{1}{\left| (3s^3 + 4)^{\frac{1}{3}} \right| \sqrt{(3s^3 + 4)^{\frac{1}{3}} - 1}} \cdot \frac{1}{3} (3s^3 + 4)^{-\frac{2}{3}} \cdot 9s^2$$

$$= -\frac{1}{3s^2 \sqrt{\sqrt[3]{3s^3 + 4} - 1} \cdot \sqrt[3]{(3s^3 + 4)^2}}$$

$$C) \frac{dg}{ds} = -\csc^{-1} (3s^3 + 4)^{\frac{1}{3}} \tan (3s^3 + 4)^{\frac{1}{3}} \cdot \frac{1}{3} (3s^3 + 4)^{-\frac{2}{3}} \cdot 9s^2$$

$$= -\frac{3s^2 \csc^{-1} \sqrt[3]{3s^3 + 4} \cdot \tan \sqrt[3]{3s^3 + 4}}{\sqrt[3]{(3s^3 + 4)^2}}$$

$$D) \frac{dg}{ds} = -\frac{1}{\left| (3s^3 + 4)^{\frac{1}{3}} \left(\left((3s^3 + 4)^{\frac{1}{3}} \right)^2 - 1 \right) \right|} \cdot \frac{1}{3} (3s^3 + 4)^{-\frac{2}{3}} \cdot 9s^2$$

$$= -\frac{1}{3s^2 \sqrt{\left| \sqrt[3]{3s^3 + 4} \right| \sqrt[3]{(3s^3 + 4)^2} \left(\sqrt[3]{(3s^3 + 4)^2} - 1 \right)}}$$

$$15) r = \sqrt[5]{\tan^{-1} 3t^2}$$

$$A) \frac{dr}{dt} = \frac{1}{5} \cdot (\tan^{-1} 3t^2)^{\frac{1}{5}} \cdot \frac{1}{(3t^2)^2 + 1} \cdot 6t$$

$$= \frac{6t \sqrt[5]{\tan^{-1} 3t^2}}{5(9t^4 + 1)}$$

$$B) \frac{dr}{dt} = (\tan^{-1} 3t^2)^{-\frac{4}{5}} \cdot \frac{1}{(3t^2)^2 + 1} \cdot 6t$$

$$= \frac{6t}{\sqrt[5]{(\tan^{-1} 3t^2)^4 (9t^4 + 1)}}$$

$$C) \frac{dr}{dt} = \frac{1}{5} \cdot (\tan^{-1} 3t^2)^{-\frac{4}{5}} \cdot \frac{1}{(3t^2)^2 + 1} \cdot 6t$$

$$= \frac{6t}{5 \sqrt[5]{(\tan^{-1} 3t^2)^4 (9t^4 + 1)}}$$

$$D) \frac{dr}{dt} = \frac{1}{5} \cdot \frac{1}{(3t^2)^2 + 1} \cdot 6t \tan^{-1} 3t^2$$

$$= \frac{6t \tan^{-1} 3t^2}{5(9t^4 + 1)}$$

Differentiate each function with respect to x . Problems may contain constants a , b , and c .

$$16) y = bx^{\frac{4}{3}} - 3a + 5$$

$$A) \frac{dy}{dx} = \frac{4bx^{\frac{1}{3}}}{3}$$

$$B) \frac{dy}{dx} = bx^{\frac{1}{3}} + 3$$

$$C) \frac{dy}{dx} = \frac{4bx}{3} - 11$$

$$D) \frac{dy}{dx} = \frac{4bx^{\frac{4}{3}}}{3} - 12$$

$$17) y = -\frac{3}{4}x^5 + 2cx^{\frac{1}{3}} + \frac{3}{5}$$

$$A) \frac{dy}{dx} = -\frac{15x^5}{4} + \frac{2cx^{\frac{1}{3}}}{3} - 6$$

$$B) \frac{dy}{dx} = \frac{2cx}{3} - \frac{15x}{4} - 1$$

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

$$D) \frac{dy}{dx} = -\frac{15x^4}{4} + \frac{2c}{3x^3}$$

$$18) y = 3bx^5 - \frac{1}{5}x^{\frac{1}{4}} - bx^{-2}$$

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

$$B) \frac{dy}{dx} = 17bx - \frac{x}{20}$$

$$C) \frac{dy}{dx} = 15bx^4 - \frac{1}{20x^{\frac{3}{4}}} + \frac{2b}{x^3}$$

$$D) \frac{dy}{dx} = 15bx^5 - \frac{x^{\frac{1}{4}}}{20} + \frac{2b}{x^2}$$

Differentiate each function with respect to the given variable.

$$19) f = \left(t^{\frac{4}{5}} + 2\right)(4t^5 + 5)$$

$$A) \frac{df}{dt} = \frac{116t^{\frac{24}{5}}}{5} + 40t^4 + \frac{4}{t^{\frac{1}{5}}}$$

$$B) \frac{df}{dt} = t^{\frac{4}{5}} + 2 + \frac{4}{5t^{\frac{1}{5}}}$$

$$C) \frac{df}{dt} = 20t^{\frac{24}{5}} + 40t^4$$

$$D) \frac{df}{dt} = 4t^{\frac{29}{5}} + 8t^5 + 16t^{\frac{19}{5}} + 5t^{\frac{4}{5}} + 10$$

$$20) h = \left(-3 + \frac{1}{r^3}\right)(2r^5 + 2)$$

$$A) \frac{dh}{dr} = -6r^5 + 2r^2 - 36 + \frac{2}{r^3}$$

$$B) \frac{dh}{dr} = -3 + \frac{1}{r^3} - \frac{3}{r^4}$$

$$C) \frac{dh}{dr} = -30r^4 + 4r - \frac{6}{r^4}$$

$$D) \frac{dh}{dr} = 2r^5 + 10r^4 + 2$$

$$21) y = \left(4 + \frac{1}{r^4}\right)(r^5 + 1)$$

$$A) \frac{dy}{dr} = -4 - \frac{4}{r^5}$$

$$B) \frac{dy}{dr} = 20r^4 + 1 - \frac{4}{r^5}$$

$$C) \frac{dy}{dr} = 4 + \frac{1}{r^4} - \frac{4}{r^5}$$

$$D) \frac{dy}{dr} = 4r^5 + r + 4 - \frac{20}{r} + \frac{1}{r^4}$$

$$22) f = \frac{4r^5 - 4r^3 - r^2}{2 + 3r^{-3}}$$

$$A) \frac{df}{dr} = \frac{20r^{10} - 12r^8 - 2r^7 + 9r^2}{4r^6 + 12r^3 + 9}$$

$$B) \frac{df}{dr} = \frac{40r^{10} - 24r^8 + 92r^7 - 72r^5 - 15r^4}{4r^6 + 12r^3 + 9}$$

$$C) \frac{df}{dr} = 40r^4 - 24r^2 + 92r - \frac{72}{r} - \frac{15}{r^2}$$

$$D) \frac{df}{dr} = \frac{40r^6 - 24r^4 + 92r^3 - 72r - 15}{16r^{12} - 32r^{10} - 8r^9 + 16r^8 + 8r^7 + r^6}$$

$$23) f = \frac{4t^3 - t^2}{4\sqrt[3]{t} - 2}$$

$$A) \frac{df}{dt} = \frac{128t^{\frac{4}{3}} - 72t - 20t^{\frac{1}{3}} + 12}{48t^{\frac{8}{3}} - 24t^{\frac{5}{3}} + 3t^3}$$

$$B) \frac{df}{dt} = \frac{18t^{\frac{8}{3}} - 3t^{\frac{5}{3}} - 2}{24t^{\frac{4}{3}} - 24t + 6t^{\frac{2}{3}}}$$

$$C) \frac{df}{dt} = \frac{32t^{\frac{7}{3}} - 18t^2 - 5t^{\frac{4}{3}} + 3t}{12t^{\frac{2}{3}} - 12t^{\frac{1}{3}} + 3}$$

$$D) \frac{df}{dt} = \frac{64t^{\frac{7}{3}} - 36t^2 - 10t^{\frac{4}{3}} + 6t}{6t^{\frac{1}{3}} - 3}$$

$$24) t = \frac{5s^4 - 4s^2}{4s^{\frac{2}{5}} + 2}$$

$$A) \frac{dt}{ds} = 72s^{\frac{17}{5}} + 40s^3 - \frac{128s^{\frac{7}{5}}}{5} - 16s$$

$$B) \frac{dt}{ds} = \frac{90s^{\frac{17}{5}} + 50s^3 - 32s^{\frac{7}{5}} - 20s}{20s^{\frac{4}{5}} + 20s^{\frac{2}{5}} + 5}$$

$$C) \frac{dt}{ds} = \frac{360s^{\frac{12}{5}} + 200s^2 - 128s^{\frac{2}{5}} - 80}{125s^7 - 200s^5 + 80s^3}$$

$$D) \frac{dt}{ds} = \frac{180s^{\frac{17}{5}} + 100s^3 - 64s^{\frac{7}{5}} - 40s}{10s^{\frac{2}{5}} + 5}$$

For each problem, you are given a table containing some values of differentiable functions $f(x)$, $g(x)$ and their derivatives. Use the table data and the rules of differentiation to solve each problem.

25)

x	$f(x)$	$f'(x)$	$g(x)$	$g'(x)$
1	2	-1	1	2
2	1	0	3	0
3	2	1	1	-2

A) $h_1'(3) = -2$ B) $h_1'(3) = -3$
 $h_2'(3) = 4$ $h_2'(3) = 5$
 $h_3'(3) = 4$ $h_3'(3) = 4$
 $h_4'(1) = -1$ $h_4'(1) = -2$

Part 1) Given $h_1(x) = f(x) \cdot g(x)$, find $h_1'(3)$

Part 2) Given $h_2(x) = \frac{f(x)}{g(x)}$, find $h_2'(3)$

Part 3) Given $h_3(x) = (f(x))^2$, find $h_3'(3)$

Part 4) Given $h_4(x) = f(g(x))$, find $h_4'(1)$

C) $h_1'(3) = -2$ D) $h_1'(3) = -4$
 $h_2'(3) = 5$ $h_2'(3) = 3$
 $h_3'(3) = 2$ $h_3'(3) = 5$
 $h_4'(1) = -1$ $h_4'(1) = -1$

26)

x	$f(x)$	$f'(x)$	$g(x)$	$g'(x)$
1	2	-1	3	-2
2	1	$\frac{1}{2}$	1	$-\frac{1}{2}$
3	3	2	2	1

A) $h_1'(2) = 2$ B) $h_1'(2) = 1$
 $h_2'(1) = -\frac{26}{9}$ $h_2'(1) = -\frac{8}{9}$
 $h_3'(1) = -6$ $h_3'(1) = -4$
 $h_4'(1) = -1$ $h_4'(1) = -2$

Part 1) Given $h_1(x) = f(x) \cdot g(x)$, find $h_1'(2)$

Part 2) Given $h_2(x) = \frac{f(x)}{g(x)}$, find $h_2'(1)$

Part 3) Given $h_3(x) = (f(x))^2$, find $h_3'(1)$

Part 4) Given $h_4(x) = f(g(x))$, find $h_4'(1)$

C) $h_1'(2) = 0$ D) $h_1'(2) = 3$
 $h_2'(1) = \frac{1}{9}$ $h_2'(1) = -\frac{8}{9}$
 $h_3'(1) = -4$ $h_3'(1) = -4$
 $h_4'(1) = -4$ $h_4'(1) = -3$

27)

x	$f(x)$	$f'(x)$	$g(x)$	$g'(x)$
1	1	2	2	1
2	3	0	3	$-\frac{1}{2}$
3	1	-2	1	-2

A) $h_1'(1) = 8$

B) $h_1'(1) = 7$

C) $h_1'(1) = 5$

D) $h_1'(1) = 8$

$h_2'(3) = 0$

$h_2'(3) = -1$

$h_2'(3) = 0$

$h_2'(3) = -2$

$h_3'(1) = 4$

$h_3'(1) = 3$

$h_3'(1) = 4$

$h_3'(1) = 7$

$h_4'(3) = -1$

$h_4'(3) = -6$

$h_4'(3) = -4$

$h_4'(3) = -3$

Part 1) Given $h_1(x) = f(x) \cdot g(x)$, find $h_1'(1)$

Part 2) Given $h_2(x) = \frac{f(x)}{g(x)}$, find $h_2'(3)$

Part 3) Given $h_3(x) = (f(x))^2$, find $h_3'(1)$

Part 4) Given $h_4(x) = f(g(x))$, find $h_4'(3)$

Differentiate each function with respect to x .

28) $y = \csc x^2 \cdot (3x^4 - 2)$

A) $\frac{dy}{dx} = 2x(-\csc x^2 \cot x^2 + 6x^2)$

B) $\frac{dy}{dx} = 12x^3 \csc x^2$

C) $\frac{dy}{dx} = -48x^4 \csc x^2 \cot x^2$

D) $\frac{dy}{dx} = 2x \csc x^2 \cdot (6x^2 - 3x^4 \cot x^2 + 2 \cot x^2)$

29) $y = \frac{\csc 3x^5}{-4x^3 + 3}$

A) $\frac{dy}{dx} = \frac{3x^2 \csc 3x^5 \cdot (20x^5 \cot 3x^5 - 15x^2 \cot 3x^5 + 4)}{-4x^3 + 3}$

B) $\frac{dy}{dx} = \frac{3x^2 \csc 3x^5 \cdot (20x^5 \cot 3x^5 - 15x^2 \cot 3x^5 + 4)}{(-4x^3 + 3)^2}$

C) $\frac{dy}{dx} = \frac{3x^2(20x^5 \cot 3x^5 - 15x^2 \cot 3x^5 + 4)}{\csc 3x^5}$

D) $\frac{dy}{dx} = 3x^2 \csc 3x^5 \cdot (20x^5 \cot 3x^5 - 15x^2 \cot 3x^5 + 4)$

$$30) y = \frac{\sec x^3}{(2x^4 + 1)^2}$$

$$A) \frac{dy}{dx} = \frac{x^2 \sec x^3 \cdot (6x^4 \tan x^3 + 3 \tan x^3 - 16x)}{2x^4 + 1}$$

$$B) \frac{dy}{dx} = \frac{x^2(2x^4 + 1)(6x^4 \tan x^3 + 3 \tan x^3 - 16x)}{\sec x^3}$$

$$C) \frac{dy}{dx} = \frac{x^2 \sec x^3 \cdot (6x^4 \tan x^3 + 3 \tan x^3 - 16x)}{(2x^4 + 1)^3}$$

$$D) \frac{dy}{dx} = x^2 \sec x^3 \cdot (2x^4 + 1)(6x^4 \tan x^3 + 3 \tan x^3 - 16x)$$

Answers to Assignment (ID: 2)

1) D
5) D
9) A
13) B
17) D
21) B
25) B
29) B

2) C
6) C
10) B
14) A
18) C
22) B
26) C
30) C

3) A
7) C
11) D
15) C
19) A
23) C
27) C

4) A
8) A
12) B
16) A
20) C
24) B
28) D