

Assignment : Rules of derivative

Date _____

Differentiate each function with respect to x .

1) $y = (x^3 + 5)^2$

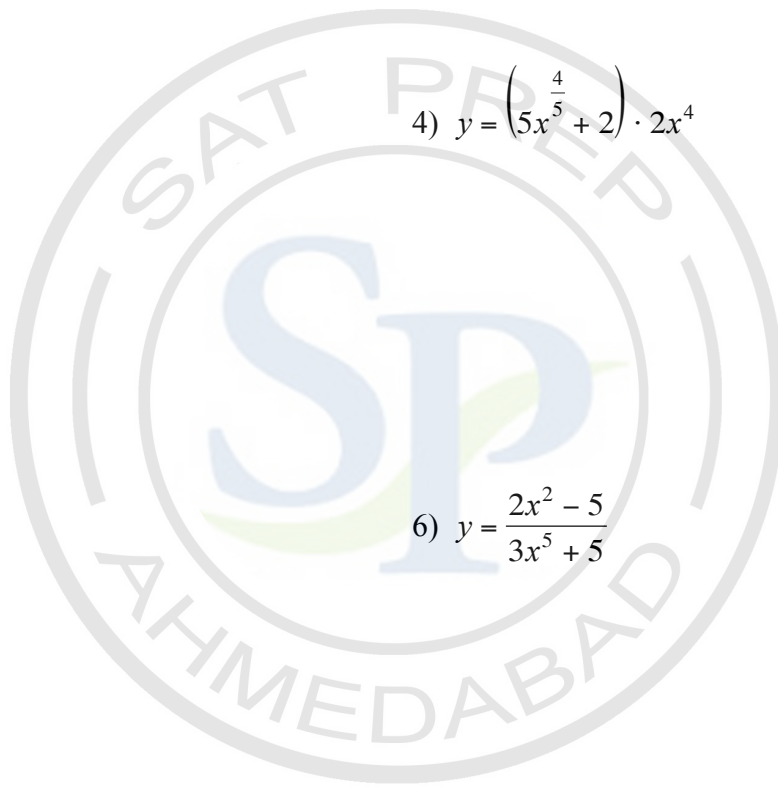
2) $y = (5x^2 + 4)^2$

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

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

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

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



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

$$8) y = \frac{3x^4 + 4x^2}{3x^4 - 5}$$

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.

x	$f(x)$	$f'(x)$	$g(x)$	$g'(x)$
1	2	1	1	2
2	3	1	3	$\frac{3}{2}$
3	4	0	4	$-\frac{1}{2}$
4	3	-1	2	-2

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

Part 2) Given $h_2(x) = f(x) - g(x)$, find $h_2'(4)$

Part 3) Given $h_3(x) = f(x) \cdot g(x)$, find $h_3'(3)$

Part 4) Given $h_4(x) = \frac{f(x)}{g(x)}$, find $h_4'(3)$

10)

x	$f(x)$	$f'(x)$	$g(x)$	$g'(x)$
1	2	2	1	1
2	4	$\frac{1}{2}$	2	$\frac{3}{2}$
3	3	$-\frac{3}{2}$	4	0
4	1	-2	2	-2

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

Part 2) Given $h_2(x) = f(x) - g(x)$, find $h_2'(3)$

Part 3) Given $h_3(x) = f(x) \cdot g(x)$, find $h_3'(2)$

Part 4) Given $h_4(x) = \frac{f(x)}{g(x)}$, find $h_4'(1)$



Answers to Assignment : Rules of derivative

$$1) \frac{dy}{dx} = 2(x^3 + 5) \cdot 3x^2 \quad 2) \frac{dy}{dx} = 2(5x^2 + 4) \cdot 10x$$

$$= 6x^2(x^3 + 5) \quad = 20x(5x^2 + 4)$$

$$3) \frac{dy}{dx} = 4x^{-3} \cdot -9x^2 + (-3x^3 + 5) \cdot -12x^{-4}$$

$$= -\frac{60}{x^4}$$

$$4) \frac{dy}{dx} = \left(5x^{\frac{4}{5}} + 2\right) \cdot 8x^3 + 2x^4 \cdot 4x^{-\frac{1}{5}}$$

$$= 48x^{\frac{19}{5}} + 16x^3$$

$$5) \frac{dy}{dx} = \frac{(3x^5 - 5)(15x^4 + 9x^2) - (3x^5 + 3x^3) \cdot 15x^4}{(3x^5 - 5)^2}$$

$$= \frac{-18x^7 - 75x^4 - 45x^2}{9x^{10} - 30x^5 + 25}$$

$$6) \frac{dy}{dx} = \frac{(3x^5 + 5) \cdot 4x - (2x^2 - 5) \cdot 15x^4}{(3x^5 + 5)^2}$$

$$= \frac{-18x^6 + 75x^4 + 20x}{9x^{10} + 30x^5 + 25}$$

$$7) \frac{dy}{dx} = \frac{(2x^4 + 4)(3x^2 + 4x) - (x^3 + 2x^2) \cdot 8x^3}{(2x^4 + 4)^2}$$

$$= \frac{-x^6 - 4x^5 + 6x^2 + 8x}{2x^8 + 8x^4 + 8}$$

$$8) \frac{dy}{dx} = \frac{(3x^4 - 5)(12x^3 + 8x) - (3x^4 + 4x^2) \cdot 12x^3}{(3x^4 - 5)^2}$$

$$= \frac{-24x^5 - 60x^3 - 40x}{9x^8 - 30x^4 + 25}$$

$$9) h_1'(2) = \frac{5}{2}$$

$$h_2'(4) = 1$$

$$h_3'(3) = -2$$

$$h_4'(3) = \frac{1}{8}$$

$$10) h_1'(2) = 2$$

$$h_2'(3) = -\frac{3}{2}$$

$$h_3'(2) = 7$$

$$h_4'(1) = 0$$