

**Product/Quotient/Chain Review**

MATH 122B

Consider the following table, and answer the below questions: (Be aware this can be asked in many different ways, with graphs, lists, part of the function given... similar to an exam question)

$x$	1	2	3	4
$f(x)$	2	4	1	3
$f'(x)$	-6	-7	-8	-9
$g(x)$	2	3	4	1
$g'(x)$	2/7	3/7	4/7	5/7

(a) If  $h(x) = f(x) \cdot g(x)$  find  $h'(1)$ .

(b) If  $h(x) = \frac{f(x)}{g(x)}$  find  $h'(3)$ .

(c) If  $h(x) = f(g(x))$  find  $h'(2)$ .

(d) If  $h(x) = f(x) + g(x)$  find  $h'(4)$ .

Find the derivative of the following: (Make sure you can simplify 'enough'... if you were to be asked to solve  $f'(x) = 0$  you want a factored form of  $f'(x)$  get it to this form as best as you can.)

1.  $f(x) = \frac{3}{x^4} - \frac{7}{x^3} + \sqrt{x} + \frac{10}{\sqrt[4]{x}}$

2.  $f(x) = x^{-1/2} - 14x^{-3/2}$

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

4.  $f(x) = (8x^2 - 4x)^3$

5.  $f(x) = 4x^3 - 6x^{-2}$

6.  $f(x) = (x + 1)(\sqrt{x} - 2)$

7.  $f(x) = 5(3x^2 + 2)(2x - 1)(x^2 + 1)$

8.  $f(x) = (x^{-1} - x^{-3}) \left( 3x^{-1} + \frac{x^4}{6} \right)$

9.  $f(x) = \frac{6x + 1}{3x + 10}$

10.  $f(x) = 10 \cdot \frac{x^{2.2}}{x^{3.2} + 5}$

$$11. f(x) = \frac{(3x^2 + 1)(2x - 1)}{5x + 4}$$

$$12. f(x) = \frac{x^2 - 4}{x^3}$$

$$13. f(x) = \frac{(2x^2 + 3)(5x + 2)}{6x - 7}$$

$$14. f(x) = (8x^4 - 5x^2 + 1)^4$$

15.  $f(x) = (3x^4 + 1)^4(x^3 + 4)$

16.  $f(x) = \frac{(5x - 6)^4}{3x^2 + 4}$

17.  $f(x) = -2(12x^2 + 5)^{-6}$

18.  $f(x) = 12x(2x^4 + 5)^{3/2}$

$$19. f(x) = \frac{x^2 + 4x}{(3x^3 + 2)^4}$$

$$20. f(x) = -3\sqrt{7x^3 - 1}$$

$$21. f(x) = \sqrt{x^3 - 6x^2 + 9x + 1}$$

$$22. f(x) = e^{\sqrt{x^3 - 6x^2 + 9x + 1}}$$

$$23. f(x) = e^{5x^2 + 3^x + e^{2x+5}}$$

$$24. f(x) = (x^6 + 4x)^{100}(x^7 + 7^x)\sqrt[7]{2 - x + x^7}$$

$$25. f(x) = \frac{(x^6 + 4x)^{100}}{(x^7 + 7^x)\sqrt[7]{2 - x + x^7}}$$

$$26. f(x) = e^{x^2}$$

$$27. f(x) = 5^{x^2}$$

$$28. f(x) = x^2 \cdot 5^{x^3}$$

$$29. f(x) = \frac{10^{x^2+6x+\sqrt{x}}}{x^2 + 6x + \sqrt{x}}$$

$$30. f(x) = 15^{\sqrt{x^3+x}}$$

$$31. f(x) = \left( \frac{8x - x^6}{x^4 + 4} \right)^{-4/5}$$

$$32. f(x) = 10 \left( 1 + \left( 2 - (6 + 7x^4)^9 \right)^3 \right)^5$$