

For the 2.1 - 2.5 assessment on 11/15/17, you need to be familiar with the following.

- All the rules of differentiation as covered so far in class.
- All the definitions of the derivative and how to apply them.
- Derivatives and continuity relationships.
- How a derivative relates to position, velocity and acceleration.
- When a derivative is equal to zero or undefined and what it means in relation to a graph.
- How to sketch a graph of a derivative based on its graph. (from HW)

For each problem, find the points where the tangent line to the function is horizontal. Indicate if no horizontal tangent line exists.

23) $y = -x^3 + 2x^2 + 4$ 24) $y = -\sin(x); [-\pi, \pi]$

Differentiate each function with respect to x .

25) $y = (\sqrt[5]{5x^3 + 1} - 1)^3$

26) $f(x) = \left(\frac{-5x^3 - 4}{x^3 + 3}\right)^{\frac{1}{5}}$

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

28) $f(x) = (x^2 + 1)^4(5x - 1)$

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

30) $f(x) = (3x^4 + 2)^{\frac{1}{5}}$ 31) $y = \sqrt{2x^3 - 1}$

32) $y = \frac{(-5x^5 - 4)^4}{4x^2 - 5}$

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

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

Use the definition of the derivative to find the derivative of each function with respect to x .

35) $f(x) = -2x^2 - 5$ 36) $y = \sqrt{3x - 2}$

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

37) $f(x) = -5x^{-3}$ Find f'' 38) $f(x) = -5x^5 + 5\sqrt[3]{x^2} + 4x^{-4}$ Find f'''

For each problem, use implicit differentiation to find $\frac{dy}{dx}$ in terms of x and y .

39) $-4y^3 + 2 = 4x^2 + 5x^2y$

For each problem, use implicit differentiation to find $\frac{d^2y}{dx^2}$ in terms of x and y .

40) $3x^3 = 2y^2 + 1$

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

$$44) y = -3ax^a + 4cx^{3b}$$

Differentiate each function with respect to x .

$$45) y = x^{\frac{3}{4}} - \frac{2}{3}$$

$$46) y = \frac{1}{2}x^{\frac{4}{5}}$$

$$47) y = (-4 - 3x^{-4})(-4x^5 + 1)$$

48)

$$49) y = \frac{4x^5}{3x^5 + 3}$$

$$50) y = \frac{3x^3 + 2}{x^4 - 3}$$

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

51)

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

Part 1) Given $h_1(x) = f(x) + g(x)$, find $h_1'(4)$

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

Part 3) Given $h_3(x) = f(x) \cdot g(x)$, find $h_3'(4)$

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

Part 5) Given $h_5(x) = (f(x))^2$, find $h_5'(1)$

Part 6) Given $h_6(x) = f(g(x))$, find $h_6'(3)$

Differentiate each function with respect to x .

$$52) y = \tan 5x^2 \sec 5x^4$$

$$53) f(x) = (2x^2 + 1) \cot 5x^5$$

$$54) f(x) = \cos \frac{3x^2}{2x^3 + 1}$$

$$55) f(x) = \sec 2x^4 \cdot (3x^5 - 1)$$

$$56) y = \sec x^4 \cdot (-x^2 - 3)$$

$$57) f(x) = \tan 3x^4$$

$$58) f(x) = \cos 2x^4$$

$$59) y = \sec 2x^4$$

$$60) y = \csc x^4$$