Act. 3.05

Rules of differentiation- Chain rule

By: Ing. Ziad Najjar

Tecnológico de Monterrey Preparatoria

Name: Alejandra Islas ID: A01510159 Date: 20/09/17

Find the derivative of the following functions: BOX YOUR FINAL ANSWER

1) $f(x)=(4x-2)^4$

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

$f'(x) = 16(4x-2)^3$

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

$= 5(-3x+1)^4 \cdot (-3)$

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

3) $f(x)=(x^2+x)^3$

$= 3(x^2+x)^2 \cdot 2x$

$f'(x) = 6x(x^2+x)^2$

4) $f(x)=\dfrac{1}{(2x+1)^4}$

$=(2x+1)^{-4}$

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

$f'(x) = -8(2x+1)^{-5}$

5) $f(x)=3(1-3x^2)^5+6x^2$

$= 15(1-3x^2)^4 \cdot (-6x) + 12x$

$f'(x) = -30x(1-3x^2)^4 + 12x$

6) $f(x)=\sqrt{3x^2-2x}$

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

$= 1/2\,(3x^2-2x)^{-1/2} \cdot (6x-2)$

$f'(x) = (3x^2-2x)^{-1/2} \cdot (3x-1)$

7) $f(x)=-\dfrac{1}{2}(3-4x)^3$

$= -3/2\,(3-4x)^2 \cdot (-4)$

$f'(x) = 6(3-4x)^2$

8) $f(x)=\dfrac{3}{(x^2-x)^3}$

$= 3(x^2-x)^{-3}$

$= -9(x^2-x)^{-4} \cdot (2x-1)$

$f'(x) = (x^2-x)^{-4} \cdot (-18x+9)$

9) $f(x)=-(x^3-4x)^3$

$= -3(x^3-4x)^2$

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

$f'(x) = (x^3-4x)^2 \cdot (-9x^2+12)$

10) $f(x)=-2\sqrt{(4-x)^3}$

$= -2(4-x)^{3/2}$

$= -3(4-x)^{1/2} \cdot (-1)$

$f'(x) = 3(4-x)^{1/2}$

11) $f(x) = \sqrt[3]{3x-2}$

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

$= 1/3(3x-2)^{-2/3} \cdot (3)$

$f'(x) = (3x-2)^{-2/3}$

12) $f(x) = \dfrac{5}{2(3-x^2)^6}$

$= 5/2\,(3-x^2)^{-6}$

$= -15\,(3-x^2)^{-7} \cdot (-2x)$

$f'(x) = 30x(3-x^2)^{-7}$

13) $f(x) = \sqrt[3]{3x^2-12x}$

$= (3x^2-12x)^{1/3}$

$= 1/3\,(3x^2-12x)^{-2/3} \cdot (6x-12)$

$f'(x) = (3x^2-12x)^{-2/3} \cdot (2x-4)$

14) $f(x) = \dfrac{8}{\sqrt{x-1}}$

$= 8(x-1)^{-1/2}$

$= -4(x-1)^{-3/2} \cdot (1)$

$f'(x) = -4(x-1)^{-3/2}$

Find the equation of tangent line to the given function at the indicated point:

15) $f(x) = (2x-3)^3$ at $x = 2$

$= 3(2x-3)^2 \cdot 2$

$= 6(2x-3)^2$

$m = 6(2\cdot 2-3)^2$

$m = 6(1)^2$

$m = 6$

$f(x) = (2\cdot 2-3)^3$

$f(x) = (1)^3$

$f(x) = 1$

$y = mx+b$

$1 = 6(2)+b$

$1 = 12+b$

$b = 1-12$

$b = -11$

$y = mx+b$

$y = 6x-11$

$y = 6x-11$

16) $f(x) = \sqrt{2x+1}$ at $x = 0$

$= (2x+1)^{1/2}$

$= 1/2\,(2x+1)^{-1/2} \cdot 2$

$= (2x+1)^{-1/2}$

$m = (2(0)+1)^{-1/2}$

$m = (1)^{-1/2}$

$m = 1$

$f(x) = \sqrt{2(0)+1}$

$f(x) = \sqrt{1}$

$f(x) = 1$

$y = mx+b$

$1 = 1(0)+b$

$1 = b$

$b = 1$

$y = mx+b$

$y = x+1$

$y = x+1$