3.6. The Chain Rule

Theorem 3.6.1 (Version 1)**.** *The derivative of a composite function, $h \circ g$, is*

$(h \circ g)'(x) =$

Theorem 3.6.2 (Version 2)**.** *If y is a function of u and u is a function of x, then we can find the derivative of y with respect to x by...*

$\dfrac{dy}{dx} =$

Examples

Example 3.6.1. *Find the derivative and simplify $f(x) = (2x+3)^5$*

Example 3.6.2. *If $y = (5 - 2x^3 - x^6)^{-3}$ find y'*

(1) $-3(5 - 2x^3 - x^6)^{-4}(-6x^2 - 6x^5)$
(2) $-3(5 - 2x^3 - x^6)^{-2}(-6x^2 - 6x^5)$
(3) $-3(-6x^2 - 6x^5)^{-4}$
(4) $-3(-6x^2 - 6x^5)^{-2}$
(5) none of these

Example 3.6.3. *Find the derivative of* $f(x) = \sqrt[4]{3x^2 - 4x + 5}$

Example 3.6.4. *If* $f(x) = (2x+3)^5(x^2+1)^7$ *find* $f'(x)$

Example 3.6.5. *If* $f(x) = x^2\sqrt[4]{2x+3}$ *find* $f'(x)$

Example 3.6.6. *Find* y' *when* $y = \dfrac{\sqrt{2x+1}}{(3x-2)^3}$

Example 3.6.7. *Find the equation of the line tangent to the graph of* $y = (x^2 - 3x + 2)^4$ *at* $x = 0$.

Example 3.6.8. *Find the equation of the line tangent to the graph of* $y = (x^2 - 3x + 2)^4$ *at* $x = 1$.

Example 3.6.9. *One of the value of x for which the graph of $f(x) = (x-1)(2-x)^3$ has a horizontal tangent line is*

(1) -2
(2) $-\frac{4}{5}$
(3) $\frac{5}{4}$
(4) $\frac{1}{2}$
(5) none of these

Example 3.6.10. *The total revenue from the sales of stereo speakers sold at \$p per stereo is given by $R(p) = 80p\sqrt{p+25} - 400, 20 \leq p \leq 100$. Find the instantaneous rate of change of $R(p)$ at $p = 75$.*

Homework: 3.6 p. 202 # 5, 9, 17, 23, 27, 35, 41, 47, 49, 51, 55, 69, 75, 77, 79, 81, work e-grade practice at least 2 times.