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The Chain Rule

Ex 1: If $f(x) = 3x^4$ and $g(x) = (3-2x)$, find $f(g(x))$.

Ex 2: For the following fcts $h(x)$, find $f(x)$ and $g(x)$ s.t. $h(x) = f(g(x))$.

a) $(2x^4 - 5)^{25}$

b) $(3-2x)^{10}$

c) $\frac{2}{3}(x^6 + 3x^2 - 11)^8$

d) $\frac{1}{(3x^3 + 3x + 5)^{3/4}}$

e) $\sqrt{x^2 + 3x}$

The chain rule says that if $h(x) = f(g(x))$, then $h'(x) = f'(g(x)) \cdot g'(x)$.

Ex 3: rework ex 2 a-e finding $h'(x)$.

Ex 4: Find the tangent line to

a) $y = (x^2 + 1)^3$ at $(2, 125)$

b) $y = \left(\frac{1}{x^3 - x}\right)^3$ at $x = 2$.

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More examples of the chain rule.

Ex 5: a) $y = \frac{5}{7} (2x^3 - x + 6)^{14}$

b) $f = (x^3 + 1)^{-5}$

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

d) $g(x) = \frac{1}{(2x^2 + 3x + 5)^{3/4}}$

e) $y = \frac{(3x+1)^5 - 3x}{7}$

Ex 6: The dollars of revenue from the sale of x items is: $R(x) = 15(3x+1)^{-1} + 5x - 15$. Find & Interpret $MR(x)$.

Ex 7: The daily sales S attributed to an advertising campaign are given by:

$$S(t) = 1 + \frac{3}{t+3} - \frac{18}{(t+3)^2}$$

where t is the number of weeks the ad runs.

a) Find ROC when $t=8$.

b) " " " " $t=10$.

c) Should the campaign continue after the 10th wk?