



CALCULUS I
FALL 2015

WRITTEN ASSIGNMENT 7
DUE SEPTEMBER 21

Exercise 1. Suppose that f and g are functions with derivatives of all orders (i.e. $f', f'', f''', \dots, g', g'', g''', \dots$ all exist), and let $F(x) = f(x)g(x)$.

- Show that $F'' = f''g + 2f'g' + fg''$.
- Find similar formulas for $F^{(3)}$ and $F^{(4)}$.

Exercise 2. In class we showed that the Power Rule

$$\frac{d}{dx}(x^n) = nx^{n-1}$$

is definitely true if n is a positive integer. Use this fact and the Quotient Rule to verify that the Power Rule holds for negative integers as well, i.e. that

$$\frac{d}{dx}(x^{-n}) = -nx^{-n-1}$$

for all positive integers n . [*Suggestion:* Write x^{-n} as a fraction.]