CALCULUS I
FALL 2015

WRITTEN ASSIGNMENT 10
DUE OCTOBER 5

Exercise 1. Let $f(x) = x^{r/s}$ where r and s are integers ($s \neq 0$). Use the Power Rule for integer exponents and implicit differentiation to show that $f'(x) = (r/s)x^{r/s-1}$. [*Suggestion:* Let $y = x^{r/s}$, raise both sides to the s power, and differentiate.][1]

Exercise 2. Use the chain rule to show that

$$\frac{d}{dx} \ln |x| = \frac{1}{x} \quad \text{for all } x.$$

[*Suggestion:* We already know this formula is valid for $x > 0$, so you may assume $x < 0$.]

[1] In class we justified the Power Rule for positive integer exponents, and in the homework we used the Quotient Rule to verify it for negative integer exponents as well. Since we only differentiated integral exponents in this exercise, we have now finally deduced the Power Rule for all rational (fractional) exponents as well!