Announcement

Math Club Meeting
Tuesday, April 18th, 2017
Blocker 220
7:00–8:00 PM

Agenda:

- officer elections
- food
- a talk by Dr. Florent Baudier

Induction proof of the power rule from calculus

Theorem (Power rule)

$\frac{d}{dx}(x^n) = nx^{n-1}$ for every positive integer n.

Proof by induction.

1. Basis step. Is $\frac{d}{dx}(x^1) = 1x^{1-1}$? Evidently yes.

2. Induction step. Suppose $\frac{d}{dx}(x^k) = kx^{k-1}$ for a certain positive integer k. Then

$$\frac{d}{dx}(x^{k+1}) = \frac{d}{dx}(x \cdot x^k) = x^k \frac{d}{dx}(x) + x \frac{d}{dx}(x^k)$$

by the product rule for derivatives. By the basis step and the induction hypothesis, the right-hand side equals $x^k \cdot 1 + x \cdot kx^{k-1}$, which simplifies to $(k+1)x^k$. Thus the statement for integer k does imply the statement for integer $k+1$. $\square$