The SUMO Speaker Series for Undergraduates

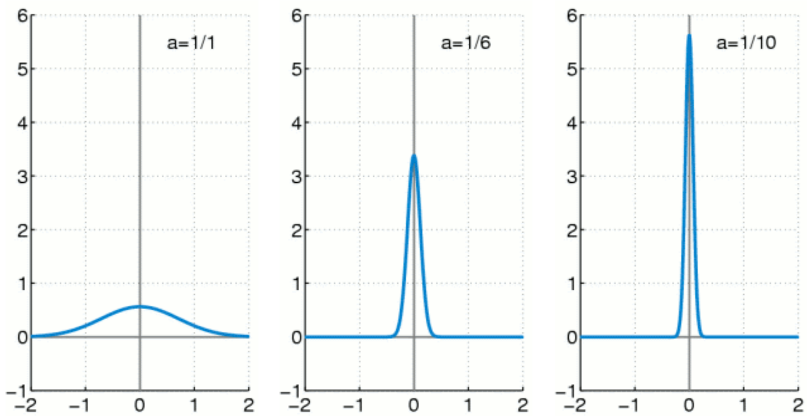
(food from Pizza Chicago)

Wednesday, May 13th

5:15-6:05, room 380C

Generalized Functions

Professor Andras Vasy



$$\int_{-\infty}^{\infty} f(x)\,\delta(x)dx = f(0)$$

ABSTRACT:

For many physical equations, such as the wave equation, there are singular solutions. For instance, for the wave equation with speed of propagation $c>0$ on $\mathbb{R}_x \times \mathbb{R}_t$, namely $\frac{\partial^2 u}{\partial t^2} = c^2 \frac{\partial^2 u}{\partial x^2}$, d'Alembert constructed the solution $u(x,t)=f(x+ct)+g(x-ct)$ for any $f,g \in C^2(\mathbb{R})$. It is natural to ask whether one could allow f,g to be just continuous, or maybe even discontinuous, corresponding, for instance, to instantly switching on a light. Distribution theory allows us to differentiate continuous functions arbitrarily many times, with the result being a distribution, or generalized function. I will explain how this works, and also give some other examples of its use.

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