

# MANY CHEERFUL FACTS

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## Riemann Revisited

a talk by Justin Blanchard

12:10 – 1:00pm on Wednesday, February 7, in room 1015.

Have you ever thought that the fundamental theorem of calculus wasn't fundamental enough? Do improper integrals just sound naughty to you? Have you wanted to paralyze a roomful of 1A students with fear, while convincing them you were doing them a favor?

In this talk I'll present the Henstock-Kurzweil integral, which generalizes the Lebesgue integral on  $\mathbb{R}^1$  but has a definition only modestly more complex than the Riemann integral. Several basic theorems you remember from calculus take simpler and more general forms when this integral is used — but this convenience comes at a price. This talk will explain both why the HK-integral is cool, and what drawbacks have kept it from becoming famous.

*I am the very model of a modern Major General,  
I've information vegetable, animal, and mineral,  
I know the kings of England, and I quote the fights historical  
From Marathon to Waterloo, in order categorical;  
I'm very well acquainted, too, with matters mathematical,  
I understand equations, both the simple and quadratical,  
About binomial theorem I'm teeming with a lot o' news,  
With many cheerful facts about the square of the hypotenuse!*

- Gilbert & Sullivan  $P \circ P$

The website for Many Cheerful Facts is  
<http://www.math.berkeley.edu/~slofstra/mcf>