

Math and Stat
Prospects in Mathematics
Thursday, November 4
3 pm ENGR 101

Refreshments will be served immediately following the talk

Speaker:
Jim Cannon



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“Wallis’s Formula For Pi”

Abstract: John Wallis (1616-1703) discovered many of the formulas we learn in our first year of calculus: the integrals of the power functions, integration by parts, etc. In the process, he discovered the beautiful formula

$$\pi/4 = 1 - 1/3 + 1/5 - 1/7 + 1/9 - 1/11 + \dots$$

We are taught in our first classes, this alternating series converges, but converges so slowly that it is useless for calculating the decimal expansion of pi. We shall first describe how this series can be derived using only integration by parts. We shall then show that, in fact, the series can be used to derive the decimal expansion of pi, with approximately one additional decimal place for each two terms of the series. Finally, we shall describe the role that Wallis's formula played in Fourier's discovery and development of Fourier series (Joseph Fourier, 1768-1830). Both Wallis and Fourier lived fascinating lives to which we shall allude.

The talk should be accessible to anyone who has had a semester of calculus.