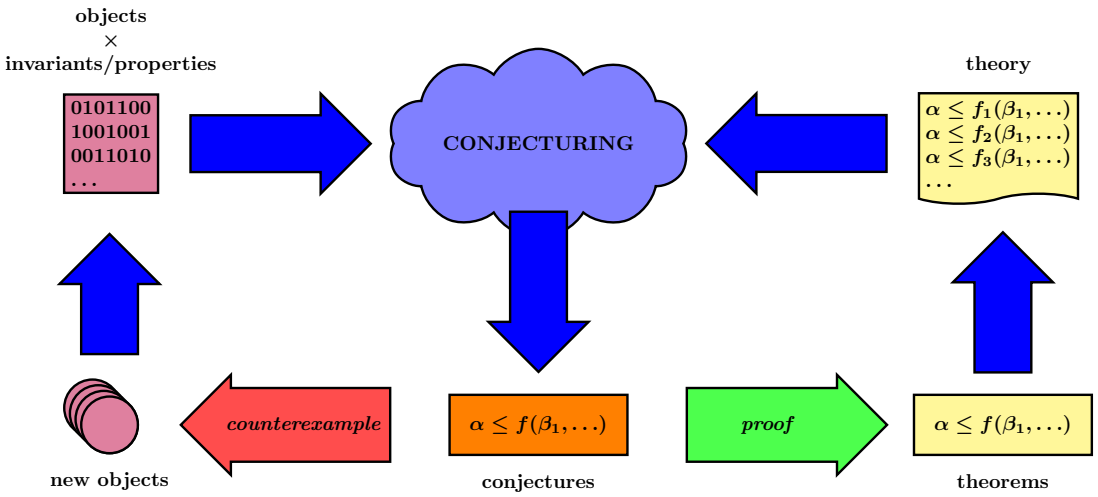
VCU Math Fall 2025 *MATH 353*

Experimental Mathematics: Number Theory with CONJECTURING

Prof Craig Larson

TTH, 11:00 - 12:15 a.m.



Odd primes either have the form $4k+1$ or $4k+3$. The $4k+1$ primes are 5, 13, 17, 29, etc. Fermat claimed, and Euler proved, that every $4k+1$ prime can be written as x^2+y^2. So, $5 = 2^2+1^2$, $13 = 2^2+3^2$, etc. Here's **a new question**: given any odd integer y, can we always find an x so that x^2+y^2 is prime?

This is a question we can start investigating by writing code to generate examples, and collect data. We can also the use state-of-the-art CONJECTURING program to generate conjectures of various kinds to help advance our investigations. And we will learn enough number theory for our experimental purposes.

The Prerequisite is Math 201. No previous coding experience is assumed. **We will code** using SAGE (in a COCALC environment). SAGE can be described as "PYTHON + math". For questions or more information, email Craig Larson @ `clarson@vcu.edu`