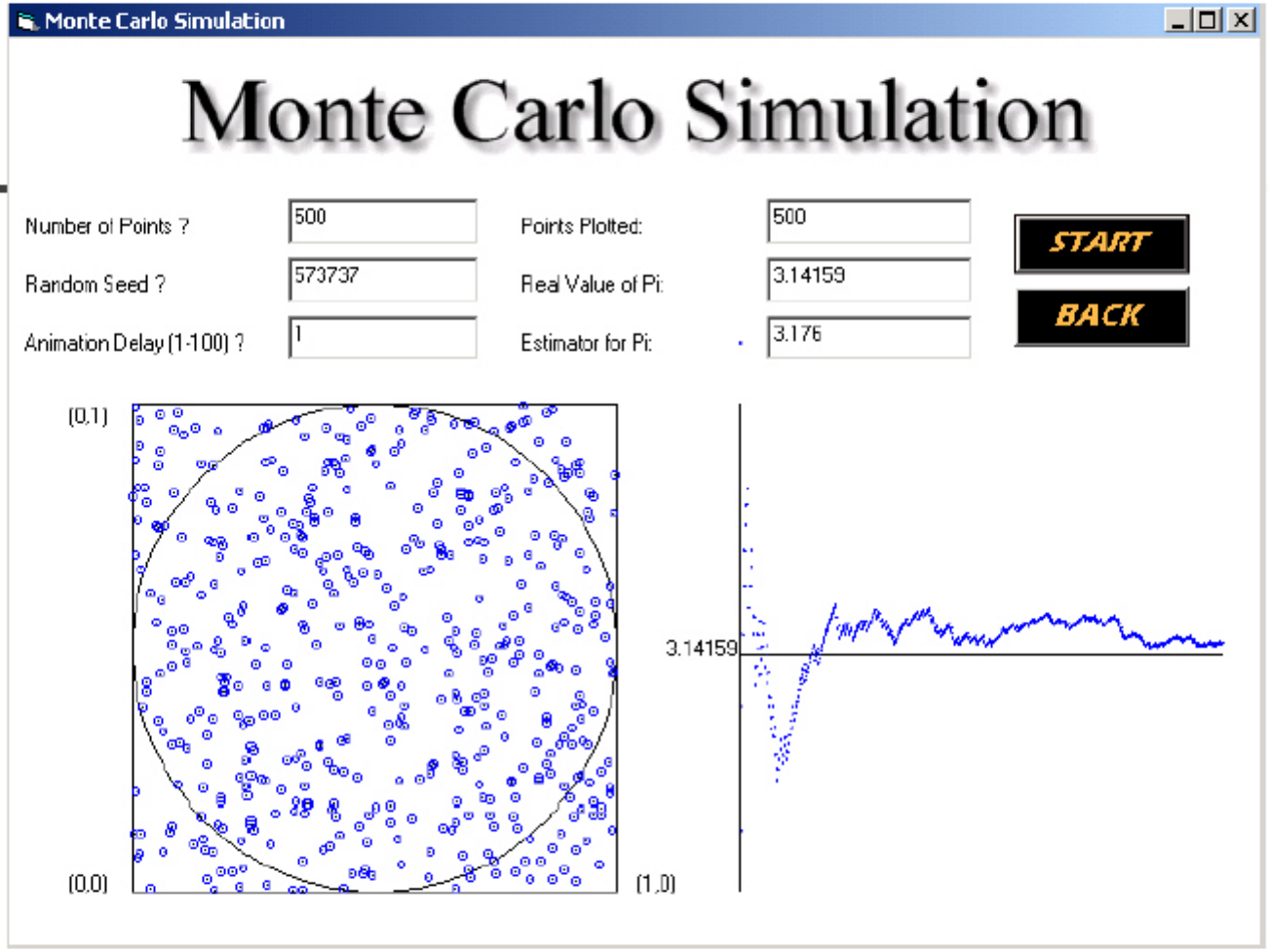
Selected Slides from Prof Goldsman

Source: https://www2.isye.gatech.edu/~sman/courses/6644/

Estimation of π

Let's Make Some Pi

- Use Monte Carlo simulation to estimate π.
- Idea:
  - Area of a unit square is 1.
  - Area of an inscribed circle is $\pi/4$.
  - Probability that a dart thrown at the square will land in the circle is $\pi/4$.
  - Throw lots of darts. Proportion that will land in circle should approach $\pi/4$.
  - Multiply proportion by 4 to estimate π.

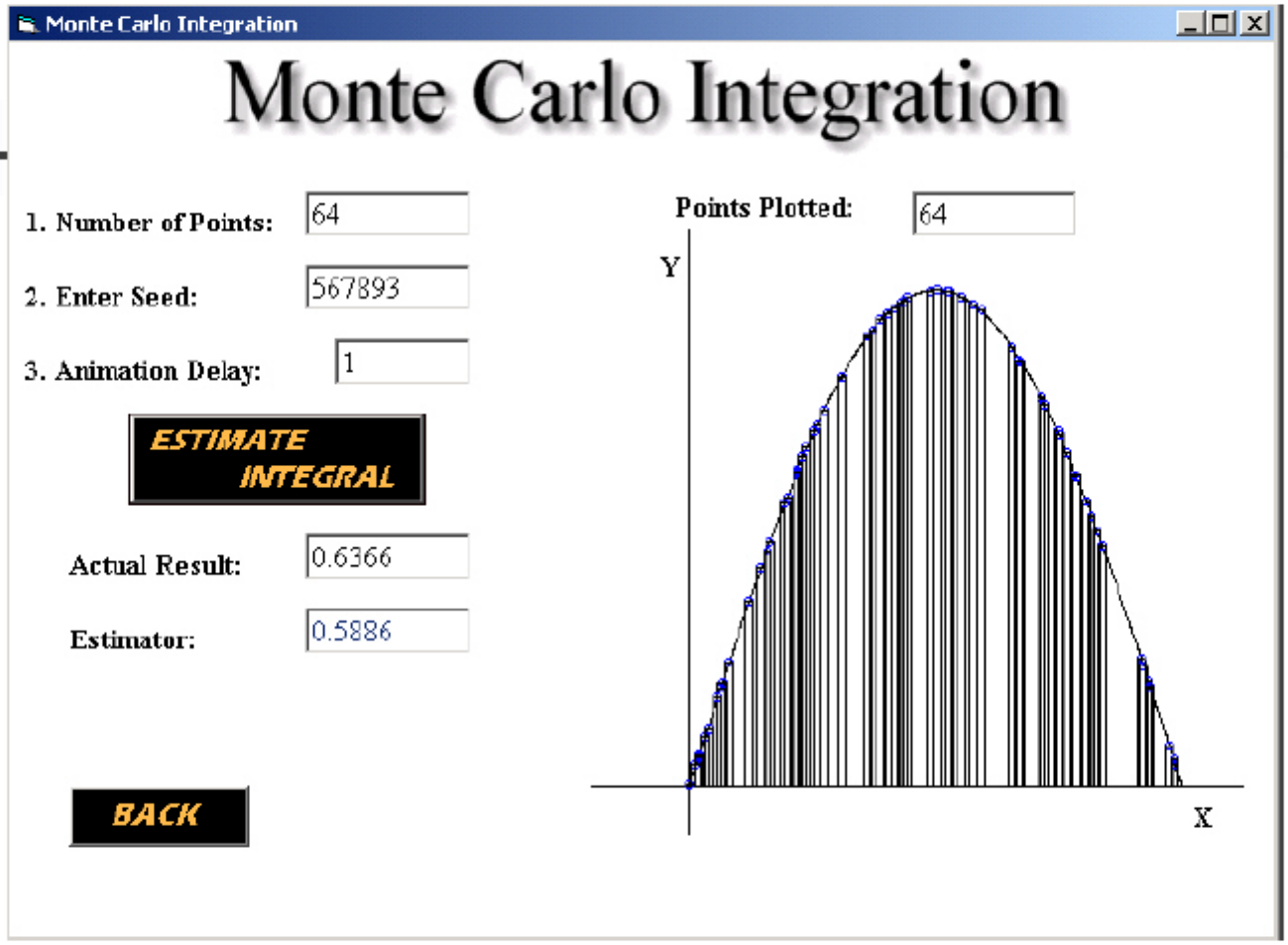


Yesterday, $\sqrt{-1}\ 2^3\ \Sigma\ \pi$, and it was really tasty!

Monte Carlo Integration

Fun With Calculus

- Use simulation to integrate
  $f(x) = \sin(\pi x)$ over [0,1].
- Idea:
  - Sample n rectangles.
  - Each is centered randomly on [0,1] and has width 1/n and height f(x).
  - Add up areas.
  - Make n really, really big.
  - Sum of areas approaches integral of f(x).


Monte Carlo Integration
Monte Carlo Integration
1. Number of Points:
64
2. Enter Seed:
567893
3. Animation Delay:
1
ESTIMATE INTEGRAL
Actual Result:
0.6366
Estimator:
0.5886
BACK
Points Plotted:
64
Y
X