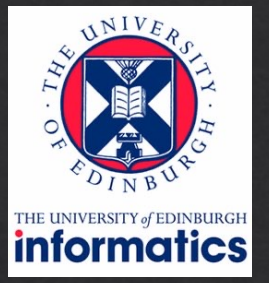


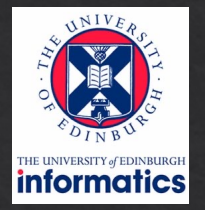
Computer Graphics

Lecture 6: Numerical integration

Kartic Subr

Speed and distance

Integrals



Approximation?

Newton-Cotes formulae

Closed Newton–Cotes formulas [edit]

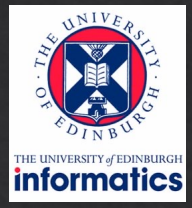
This table lists some of the Newton–Cotes formulas of the closed type. For $0 \le i \le n$, let $x_i = a + i\frac{b-a}{n} = a + ih$, and the notation f_i be a shorthand for $f(x_i)$.

Closed Newton–Cotes Formulas

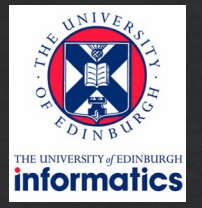
n	Step size h	Common name	Formula	Error term
1	$b-a$	Trapezoidal rule	$\frac{h}{2}(f_0+f_1)$	$-\frac{1}{12}h^3 f^{(2)}(\xi)$
2	$\frac{b-a}{2}$	Simpson's rule	$\frac{h}{3}(f_0+4f_1+f_2)$	$-\frac{1}{90}h^5 f^{(4)}(\xi)$
3	$\frac{b-a}{3}$	Simpson's 3/8 rule	$\frac{3h}{8}(f_0+3f_1+3f_2+f_3)$	$-\frac{3}{80}h^5 f^{(4)}(\xi)$
4	$\frac{b-a}{4}$	Boole's rule	$\frac{2h}{45}(7f_0+32f_1+12f_2+32f_3+7f_4)$	$-\frac{8}{945}h^7 f^{(6)}(\xi)$

https://en.wikipedia.org/wiki/Newton–Cotes_formulas

Problems?



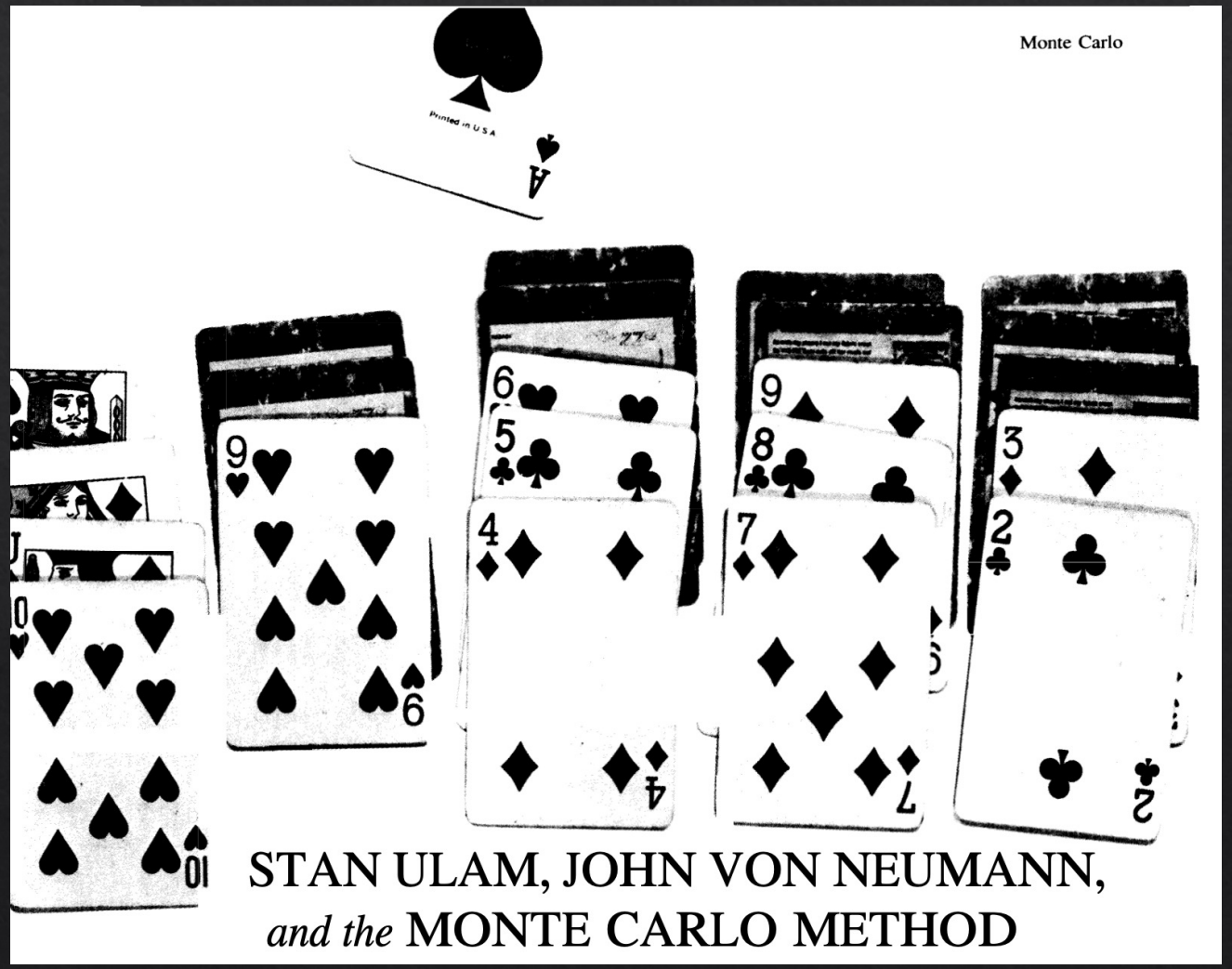
A random slide



Squaring the circle

THE UNIVERSITY of EDINBURGH
informatics

Monte Carlo method



http://www-star.st-and.ac.uk/~kw25/teaching/mcrt/MC_history_3.pdf