

Uses of a Computer

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Fall 1998, Lecture 01

Tables

- General Mathematical Tables
 - Multiplication, squares, cubes, square roots, cube roots
 - Factors, reciprocals, factorials
 - Constants: pi, etc.
 - Logarithms to base “e” and base 10, antilogarithms
 - Trigonometric functions, hyperbolic functions
 - Common integrals
- Navigational Tables
- Tax Tables
- Actuarial Tables
- Artillery Tables

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Early Calculating Devices

- Pencil and paper (or equivalent)
- Abacus (~2500 BC)
- Napier's Bones (1617)
- Slide Rule (1630)
- Pascal's Adding Machine (1642)
- Hahn's Calculating Machine (1774)
- Thomas' Calculating Machines (1820)
- Burkhardt's Calculating Machines (1878)

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John Napier

- John Napier (b1550 Edinburgh, d1617)
 - “Seeing there is nothing... that is so troublesome to Mathematical practise, nor that doth more molest and hinder Calculations, then the Multiplications, Divisions, square and cubical Extractions of great numbers, which beside the tedious expence of time are for the most part subject to many slippery errors. I began therefore to consider in my minde, by what certain and ready Art I might remove those hindrances.”
- *Description of the Admirable Canon of Logarithms* (1614)
 - First description of logarithms
 - Multiply A x B: $10^{\log_{10}(A) + \log_{10}(B)}$

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Napier's Bones and The Slide Rule

- Napier's Bones (1617)
 - Used logarithms to calculate multiplications, divisions, square roots, and cube roots
- Slide rules
 - Straight logarithmic slide rule, rulers held together by hand (Oughtred, 1630)
 - Circular slide rule (Delamain, 1630)
 - Slide between two fixed rulers (?, 1654)
 - Square and cube scales (Warner, 1722)
 - Runner added to rule (Robertson, 1775)
 - Used by many engineers and scientists until late 1970s (until pocket calculator)
 - For slide rule instructions, pictures, etc. see "Before HP Calculators" at the Museum of HP Calculators — www.teleport.com/~dgh/hpmuseum.html

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Calculating Machines

- Pascal's Adding Machine (1642)
 - Addition, subtraction, multiplication by repeated addition
 - Designed for tax computations (for his father, who was appointed Superintendent in Rouen in 1641)
 - Units: 12 deniers = 1 sol, 20 sols = 1 pound

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Calculating Machines (cont.)

- Hahn's Calculating Machine (1774)
 - Addition, subtraction, multiplication, division
 - Manufactured a variety of models
- Thomas' Calculating Machines (1820)
 - Sold many models of "arithmometer"s
 - Only firm selling calculating machines worldwide until 1878
- Burkhardt's Calculating Machines (1878)
 - Sold many models
 - Thomas' main competition

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