



## The Art of Learning Well

### Essentials of Calculus, A Jump Start

*The central ideas of calculus, typically introduced over a year-long course, are actually so intuitive and straightforward that they can be learned in a few afternoons.*

*Robert Lenk*

This workshop teaches students the core concepts of differential and integral calculus, conveying the remarkable power of mathematics. Understanding calculus as a tool across so many disciplines is one clear way to inspire students toward in-depth learning via applications.

#### Topics

- Meaning and nature of derivatives
  - Geometric/visual derivation
  - Derivatives of polynomials, other simple functions
  - Basic ways to handle fancier things: chain, product, quotient rules
  - Differentials and implicit differentiation
  - Higher derivatives
- Meaning and nature of integration
  - Antiderivatives / indefinite and definite integrals
  - Handling fancier things: sums, constant multiplier, etc.
  - Some useful basic techniques of integration: by parts, substitution, etc.
  - Higher-dimensional integration
- Differentiation and Integration: two sides of same coin
  - Fundamental Theorem(s) of Calculus
- Elementary differential equations
  - Intuition for meaning of such equations
  - Basic methods of finding general and particular solutions
- Examples: Application to biology, simple business and economics, basic statistics  
physics and geometry

Where: Cyberport 3, Boardroom 2

When: April 2-6, 3-5pm

Admissions Criteria: Algebra

Basic Trigonometry (though not required)

Intended for: High School students in good standing (grades 9-11)

advanced Middle School students (grade 8)

Program Fee: \$12,000 (includes consultation and all learning material)

*After earning his undergraduate and doctoral degrees in physics (Urbana, MIT), Robert Lenk worked in the theoretical physics group at a large European accelerator laboratory. He then transitioned to quantitative finance, working first at JP Morgan in New York, then with UBS in the US and Hong Kong as head of their dollar exotic derivatives desk. After several years in Hong Kong, the appeal of entrepreneurship drove him to found a math model-driven proprietary trading company based in Hong Kong. Above all other things, Robert Lenk is a parent, and from his experience with his own children, a passionate promoter of excellence in teaching.*