U3A Maths

Week 1 No class

18-Feb-2025 Term 1/Week 2

Variables

- Introduction to (Week 2!) Bapu Sesha-prasad!
- Variable → Computer Variable / Algebraic Variable
- Computer variable is a 'pseudo' address for a memory location.

Physical Address ↓

Variable	Physical Address	Value
x	1	25
y	3	18
z	9	16

0	10
1	25
2	12
3	18
⋮	⋮
9	16

- Hence a computer variable is essentially convenient address specifier for the user.

$x = 15$ – changes the value from 25 to 15.

$\therefore z = x + y = 15 + 18 = 33$

- Hence, changes the value of address '9' to 33.
- Note that the expression $x = x + 1$ is valid in computers.

$x = 15 + 1 = 16$

The value at address '1' is changed to 16

- Hence '=' in computer essentially means 'access' and 'Store' the value in physical address.

- An Algebraic Variable (Latin "variabilis" or "changeable") is a symbol typically a letter that refers to an unspecified mathematical object
- Colloquially, a variable represents an object

For Ex 4 apples ⇒ 4a where 'a' represents 'apple'

It can also be 4b!

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(European!)

In early modern period:

- Francis Viete (1540-1603) introduced
  Vowels ⇒ Variables
  Consonants ⇒ Constants

  Variable ⇒ unknown value
  Constant ⇒ known value.

- Rene Descartes (1596-1650) introduced the convention of x, y & z for unknowns

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in equations and a, b & c for knowns

- This is still in common use even today!

- Issac Newton (1642-1727)
  Gottfried Leibniz (1646-1716)

introduced 'calculus' which dealt with time varying variables namely $x(t)$ & rate of change
$\dot{x}$ — Newton
dx/dt — Leibniz

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- Leonhard Euler (1707-1783)

introduced the concept of general 'function' of variables

Ex: $y = f(x)$

where $f(x) = x+1$

- Carl Gauss (1777-1855)

introduced functions of 'complex' variables.

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- Lastly, Variables, quadratic equations & cubic equations were used much before.

- Babylonians (1700 BC)

- Euclid (300 BC)

- Diophantes of Alexandria (200 AD)

- Brahmagupta (600 AD) Complete treatise on mathematics!