Intro & Structure of 21C

Friday, March 31, 2023 7:36 PM

Part 1: $f(x) =$ 1 variable

- infinite series using sequences
- ch.10

Part 2: $f(x, y, z) =$ multi-variable

- ch. 12, 13, 14

math goals for part 1:

- sequences: definition, examples, uses
  - definition: list of numbers
    - 1, 1.1, -2.3, -2.31, -2.312
    - $x_n = n^2 - 1 \longrightarrow$ $n=1$, $n=2$, $n=3$, $n=4$ ... → 0, 3, 8, 15
  - * doesn't matter if #'s are related → any list of #'s *
  - examples:
    - convergent: there's a limit / better approximation
    - divergent: goes off to infinite # / bad approximation
  - uses: approximate functions / estimating unknown / what function is going towards (limit)
- series: sum of elements of sequence

what is a function & how is it given?

- polynomials
  - $1 + x - 3x^5$
  - involves +, −, ×, and non-negative exponents / easily solvable by human
- computable formulas
  - sums, powers (negative), roots / not easily solved by human / computer can solve
  - $\frac{1}{4x^4}$
- bessel function

- bessel function
  - sound of membrane
- spherical harmonies
  - electrons orbiting on atom
- airy function
  - rainbows (scattering light)
  - $f''(r) = f(r) \cdot r$ (ODE: 2nd)

} $f(r)$