ME 3001 Lecture, Roots of Non-Linear Equations
A Finite Difference Approach - The Secant Method

- **What does secant mean?**

- **The Newton-Raphson method is not purely numerical, why?**

  – The Equation

  – The Derivation

- **How can we avoid this issue?**

- **Introduce the** *Secant Method (modified Newton-Raphson)*
  - Forward Difference

  - Backwards Difference

  - Central Difference

– These are know as *Finite Difference Approximations* .

– When they are used in the *Newton-Raphson* equation this becomes the *Secant Method* .

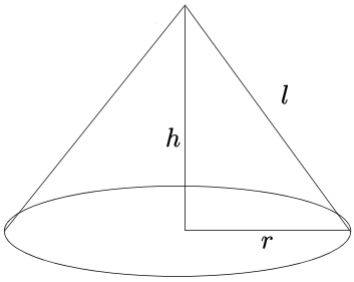
– So what is different about using this method?

A Brief Introduction to Optimization

- **What is Optimization ?**
  - Find Local Minima and Maxima
  - Constraints

- **Root finding and Optimization?**
  - Using the derivative, 4^{th} form of the problem...

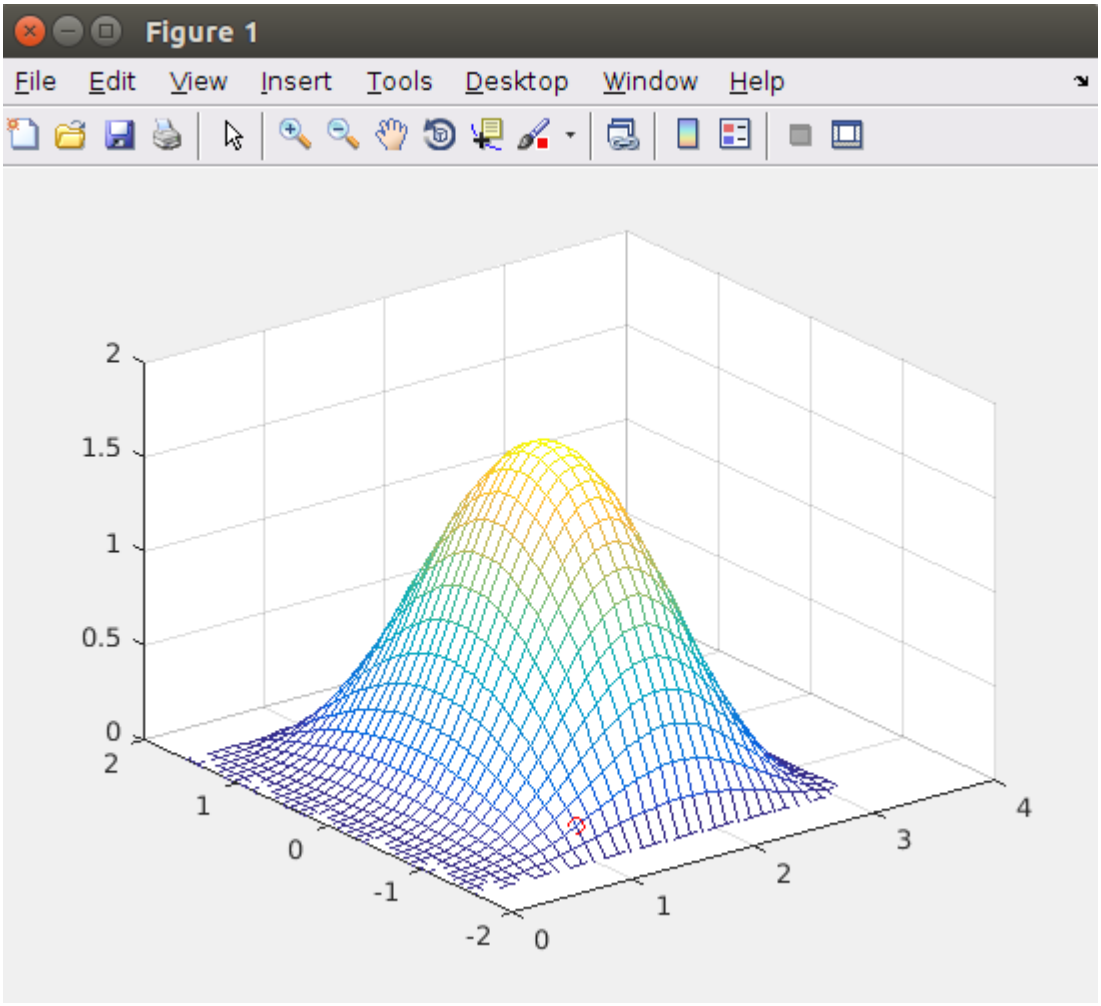
- **What kind of problems do we solve? Think about the cone we designed a few days ago.**



surface area, $s = \pi r l = \pi r\sqrt{h^2 + r^2}$

volume, $v = \pi r^2 \frac{h}{3}$

- **Optimization Techniques**



  - Brute Force

  - Steepest Accent

REMINDERS

- **Homework was due Friday but there is a late policy.**
- **The late policy has changed slightly. Please see the syllabus**
- **MATLAB script from today's lecture will be posted on ilearn.**