

## Module 1 - Non Linear Equations

ME3001 - Mechanical Engineering Analysis

Mechanical Engineering

Tennessee Technological University

## Topic 2 - Mechanical Design Problem

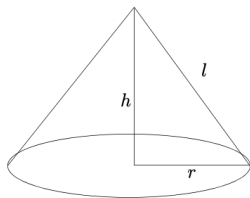
## Topic 2 - Mechanical Design Problem

- Problem Statement
- Mathematical Model
- Solution Approach
- Design!

## Problem Statement

### A Mechanical Design Problem

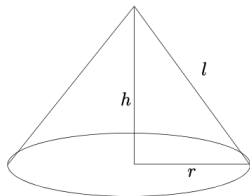
As an engineer you are asked to design a structure. The geometry of this structures is simple but certain properties are critical. Also you want to spend as little as possible on materials.



You are required to design is a cone with a surface area of exactly  $25m^2$  to a tolerance of  $0.1 m^2$  and a height of exactly  $1m$ . Your goal is to find the radius in meters.

## Mathematical Model

What is the *mathematical model* of the cone?



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

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

## Solution Approach

How are you going to solve this problem?

# Design!

How are you going to *design* the cone?

