What Is *Engineering Analysis Using Numerical Methods?*

ME 2004

Outline

- 1.1: What is Engineering Analysis?
- 1.2: What is Numerical Methods?

1.1: What is Engineering Analysis?

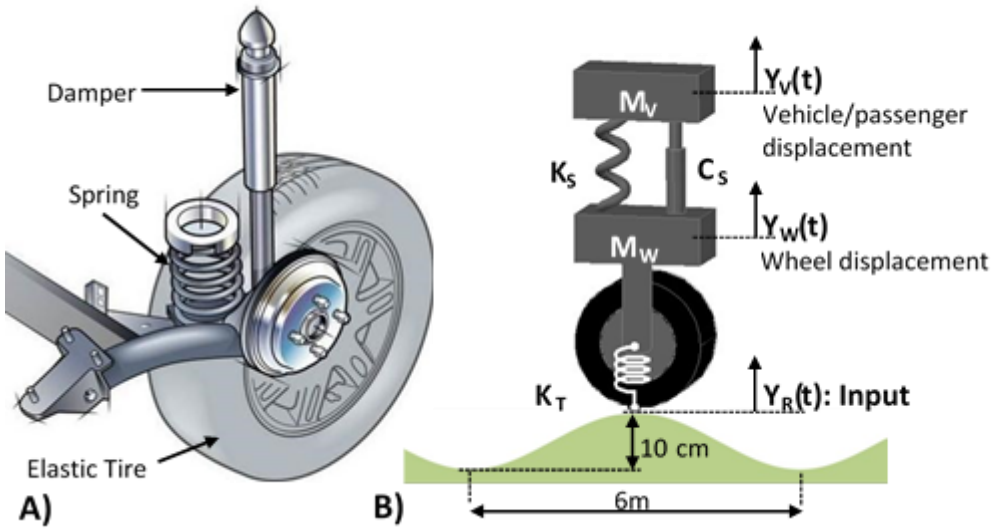
What is Engineering Analysis?

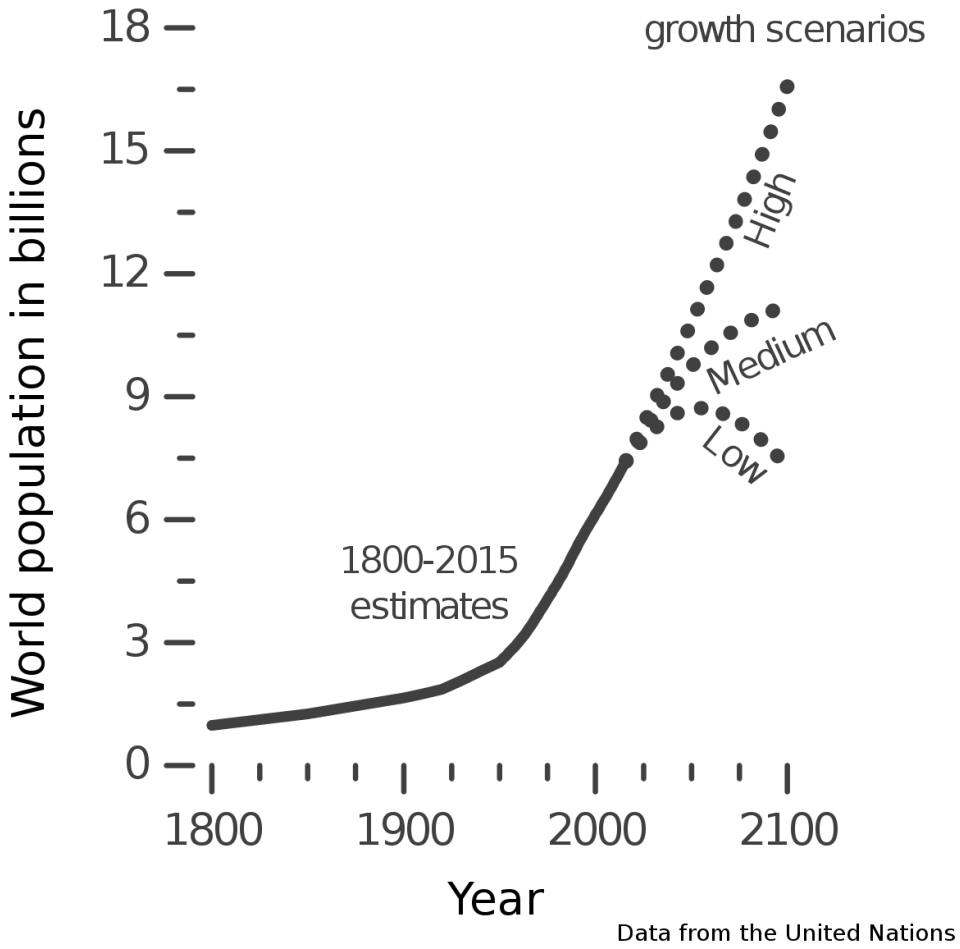
"Engineering Analysis involves the application of scientific analytic principles and processes to reveal the properties and state of a system, device or mechanism under study. –Wikipedia"

–Jaisohn Kim

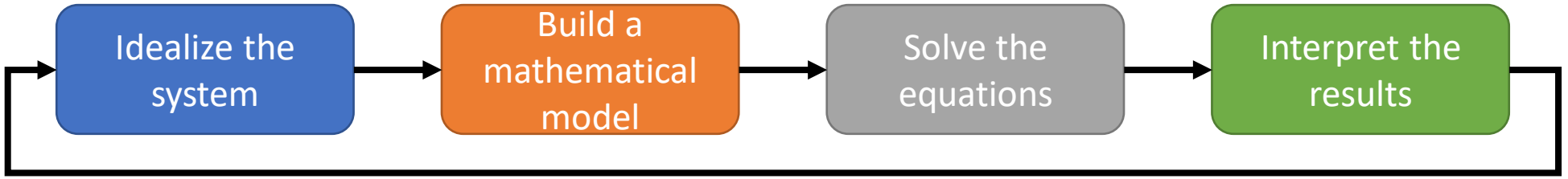
- In other words: understanding how a complex engineering system works by decomposing it into simpler parts

What is Engineering Analysis?





What is Engineering Analysis?



1.2: What is Numerical Methods?

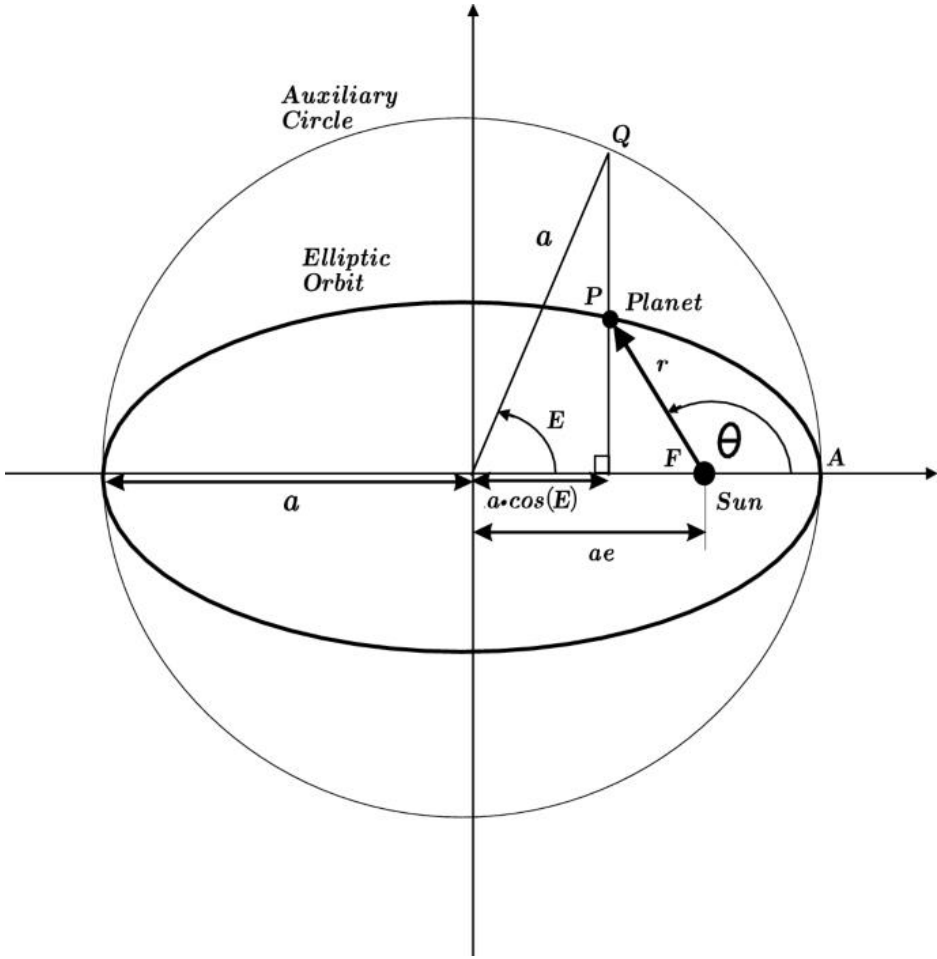
What is Numerical Methods?

- Kepler's Equation:

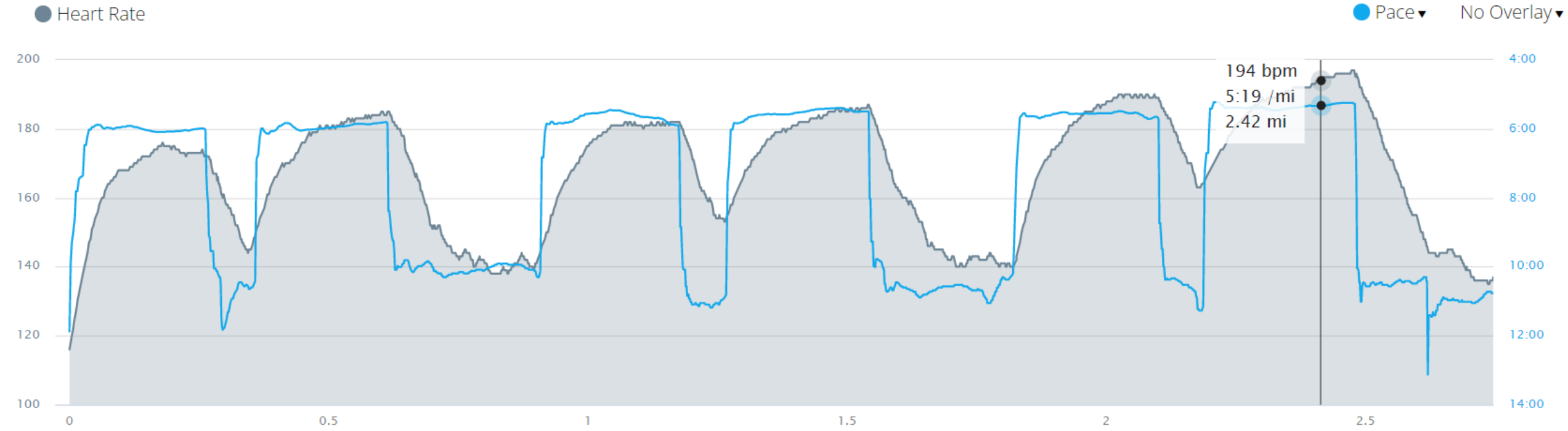
$$M = E - e\sin(E)$$

  - M = mean anomaly (known)
  - e = eccentricity (known)
  - E = eccentric anomaly (unknown)

$$E = \_\_\_\_\_$$



What is Numerical Methods?



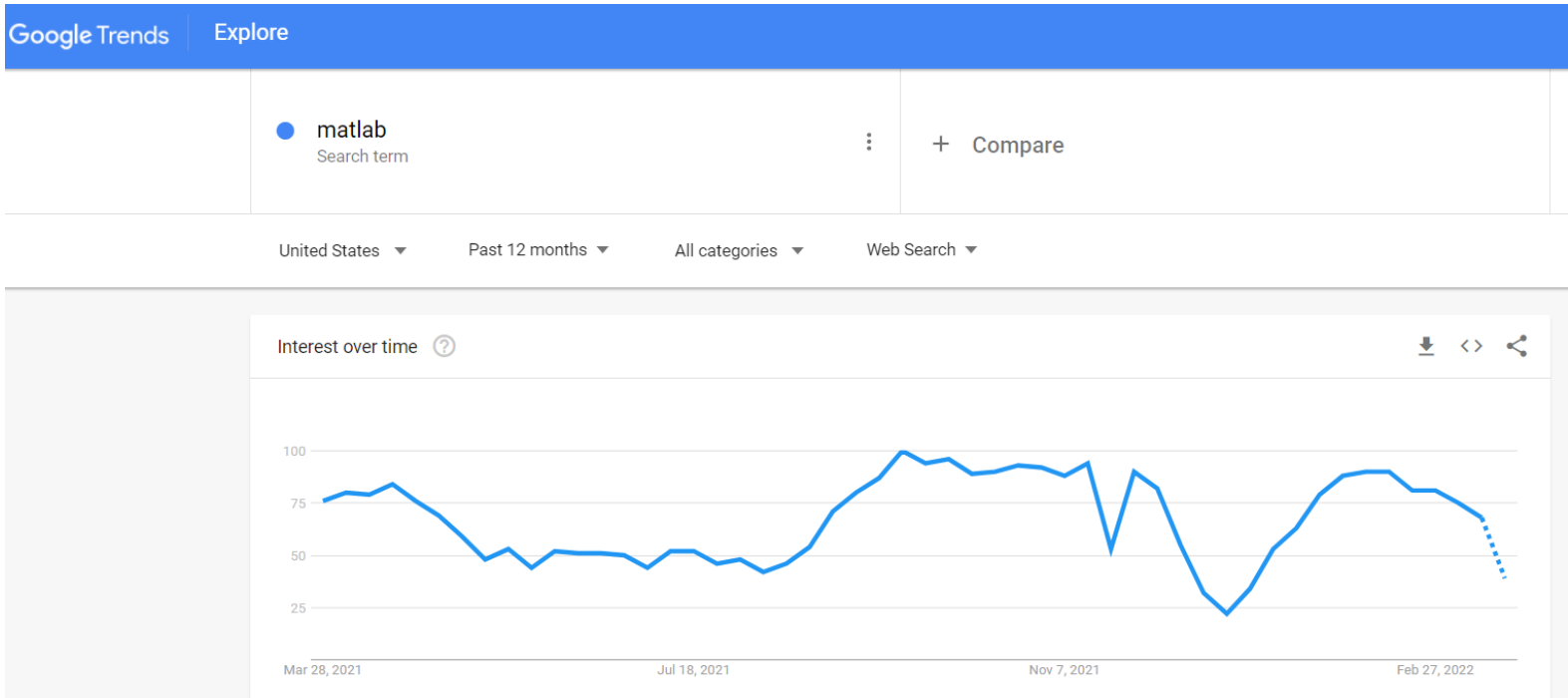
What is Numerical Methods?

- Numerical Methods: using algorithms to approximate the solution to a problem.

- Concise definition: *numerical methods = making educated guesses*

What is Numerical Methods?

- Most of the algorithms we'll learn are iterative
- MATLAB usage stats:
  - 6500+ universities
  - 82% of Fortune 100 companies
  - 5000+ accelerators/startups



Putting It All Together