Engineering Analysis "ENG180"

Algebra
"Operations on Numbers"

Geometry
"Shapes"

Mathematics

Approximation Sets

Calculus
"Relations"

Analytical Geometry

* Mathematics $\Rightarrow$ logic
* Science $\Rightarrow$ laws of nature
* Engineering $\Rightarrow$ Analysis & Design of a product or a process
* Technology $\Rightarrow$ Manufacturing
1. Algebra:
   - Operations on numbers

   **Numbers**
   - Integers: -4, 3, 12
   - Rational: \(\frac{3}{2}, \frac{4}{3}, \frac{5}{7}\)
   - Irrational: \(\pi, e, \sqrt{2}\)
   - Complex: \(2 + 3i\)

   - Complex numbers are 2D but much powerful
     than vectors "for example vectors have no
     inverse". But vectors can be 3D or more!

2. Geometry:
   - Deals with shapes

   **Shapes**
   - Curves
   - Surfaces

   - Euler formula:
     \[V + F = E + 2\]

     - No. of Points
     - No. of Faces
     - No. of Edges

     \[V = 5\]
     \[F = 5\]
     \[E = 8\]
Prove that
\[ c^2 = a^2 + b^2 \]

3. Calculus:

- Relations (functions) between variables, \( y = f(x) \)

- Pythagoras proved the fundamental theorem of geometry

- Gauss proved the fundamental theorem of Algebra

- Leibnitz proved the fundamental theorem of Calculus.

\( f \) Gauss theorem, Stokes theorem, Reynolds transport theorem, \( f \)