Review in a picture of single variable calculus.

Fundamental Theorem of Calculus:

\[ \int_{a}^{b} f(x) \, dx = F(b) - F(a) \]

where \( F' = f \)

Another way to think of \( f(x) \)

Problem: real life is rarely so simple...

Want to be able to understand such functions.

Rainfall → First day of growing season → Pop of Atkins diet → Price of oats
law have many outputs, too

3:30 pm

$(3, 1)$

Need to numbers to describe his position

Outline of course:

- Vectors and geometry of $n$-dimensional spaces
  - Plane, 3-space, directions, planes, [dot and cross products...]
  - Linear transformations, matrices

Functions of several variables: Differentiation

What are other ways of thinking about $f'$?

1) Rate of change
2) Taylor series

$$f(x) = f(0) + f'(0)x + \frac{f''(0)}{2}x^2 + ...$$

[What are "simple" functions of one variable? Linear transformations]
Optimization: [Finding min/max.]
- With constraints
- Linear programming

Integration: Areas, Volumes, Averages over multidimensional objects

Curves and Surfaces in 3-space:

Length

Surface area

Flux: Fluid

[Amount of current induced in a wire by a magnetic field...]

(2)
Finally, we will study interrelationships between those
which generalize the fundamental theorem
of calculus (Stokes theorem).

[Warning: This course gets harder as time goes on....]

Area in terms of something computed along the boundary.