Stats camp day 2

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Welcome back: math time!

Agenda today

1. Math notation and concepts
2. Functions, limits, algebra
3. Linear algebra
4. Calculus

Notation and concepts

Real numbers and integers

Real numbers (doubles)

- Any continuous number
- E.g. 4, 4.189, 2/3, π
- In programming, we often use the variable type double for real numbers

Integers

- Any whole number
- 10, -10, 24, 87
- In programming, we may use the integer variable type

Variables

- May take on any value
- May be explicitly defined as a type in programming
- Represented by letters, generally x, y, z

Functions

Perform a specified operation to a variable

$$f(x) = 2x^2 + 12$$

What is $f(x)$ for $x = 3$? For $x = -2$?

Some common functions

Some common functions

##Summation

Represented as $\sum$, with integer begin and end points

$$\sum_{k=1}^{3} 2(k+2) = 2(1+2) + 2(2+2) + 2(3+2) = 24$$

In R, we can calculate a sum using the sum() function

```
i<-1:3
sum(2*(i+2))
```

```
## [1] 24
```

##Products

Represetened as $\prod$, with integer begin and end points

Limits

Algebra

Coordinates and lines

Matrices

Matrix operations

Derivatives

Integrals

Acknowledgments

These slides borrow heavily from Laina Mercer's math camp slides for University of Washington CSSS doctoral students. That course is available here: `https://www.csss.washington.edu/academics/math-camp/lectures`