Good afternoon

Warm up in notebooks (leave first page blank--table of contents)

Your car enters a toll highway at 1pm. The highway stretches for 120 miles and has a speed limit of 55mph. You come to the toll booth at the end of the highway at 3pm and are handed a speeding ticket.

Why? Explain your reasoning.

mean value theorem.

What is "calculus"? What will we learn in this class?

math of changes (vs. time, usually.)

Talk about it with your face partner.

Four topics:

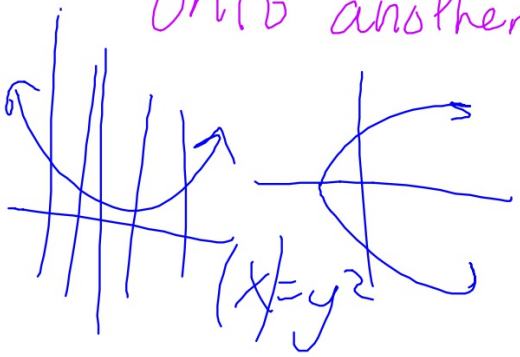
- Limits: an operator performed on mathematics
- Derivatives: the instantaneous rate of change of a function
- Integrals: the accumulation of change and area under curves
- Applications of integrals: everything you can imagine

Four approaches

Verbal Numerical Algebraic/Analytical Graphica

What is a function?

a mathematical mapping of one set (inputs) onto another (outputs)

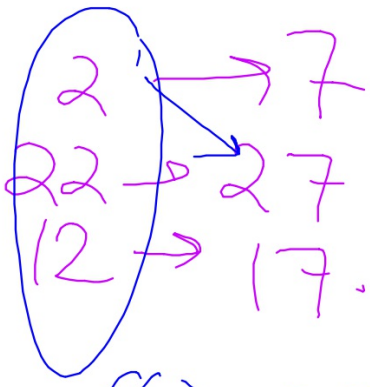


$f(x) = x^2$

$2 \to 4$

$3 \to 9$

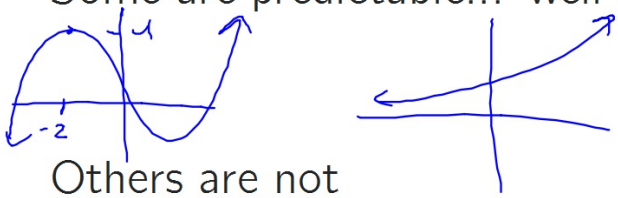
$f(x) = x+5$

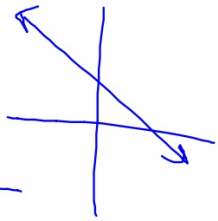


$f(x) = 3$

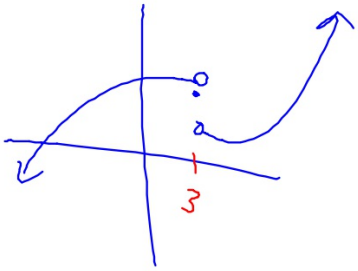
How do functions behave?

Some are predictable..."well behaved"





Others are not



What is a limit? $\lim_{x \to c} f(x) = b$

The limit of $f(x)$ as x approaches c (some number)
is b (some number.)

A limit is: - an operator, something done to math
other operators: +,-,x,÷, ln,√

- an output, or "y-value"

MY FIRST limit

$\lim_{x \to 4} x+2 = \underline{\quad 6 \quad}$?

Direct Substitution.

A limit asks the question: as the input approaches a value (from either or both sides), what happens to the output?

Well-behaved

Bad Boys

Let's take our first limit, algebraically

$$\lim_{x \to 3} 2x+5$$

☒ Let's try another!

$$\lim_{x \to 3} \frac{x^2-9}{x-3}$$

You used a limit...

It's not very effective...