

# **MATH 421**

## **The Theory of Single Variable Calculus**

# Introductions – Me

**Instructor:** Grace Work

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**Office:** VV 311

**Drop-in Hours:**

- Wednesday: 12:00-1:00 pm (**VV 311**)
- Thursday: 9:00-11:00 am (**VV B205**)
- By appointment & open door

# Introductions – Course

## This class requires...

- Active learning
- Mindful preparation
- **Goals** – transitioning from *computational* to *theoretical*
- **Logistics** – See syllabus on Canvas

# Introductions – You!

Form groups of 4-6 and introduce yourselves!

- Name/pronouns
- Year/major
- A fact about yourself – can be as “fun” or as “boring” as you like. Suggestions:
  - Favorite hobby.
  - What you most recently ate.
  - Where you were born.

# Setting the Stage

For each of the questions that follow, I will ask you to:

- ① **THINK** about a possible answer on your own.
- ② **DISCUSS** your answers with the rest of your group.
- ③ **SHARE** key points from your group's discussion to Padlet.

# Discussion Questions

- ① How does one learn a new skill?
- ② What is the value of making mistakes in the learning process?
- ③ How do we create a classroom environment where risk taking is encouraged and productive failure is valued?



# **Chapter 0: Foundations**

# Once Upon a Time...

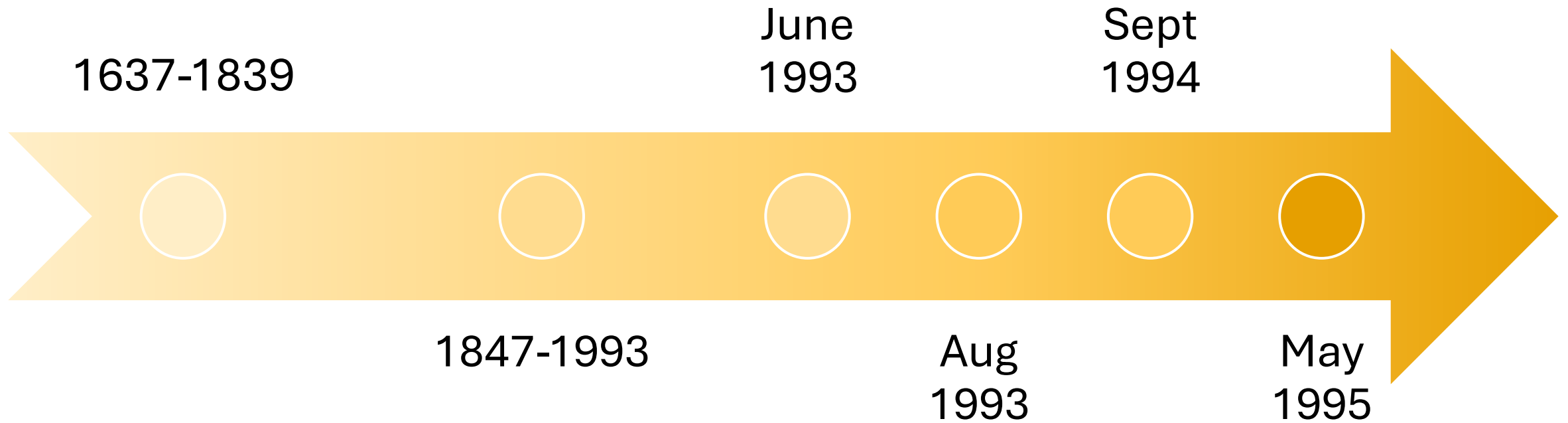
**Conjecture (Fermat, 1637):** *There are no positive integers  $a, b, c$  that satisfy*

$$a^n + b^n = c^n$$

*for any integer value of  $n$  greater than 2.*



# Timeline to Proof



# Types of Mathematical Statements

Assumed true without  
proof

Axioms

No proof yet known

Conjecture

Proof required to show  
true

Theorem

Lemma

Definitions

Proposition

Corollary

# Activity: Is it a sandwich?

A



Triple-decker club

B



BLT

C



Submarine

D



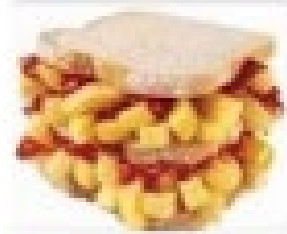
Chicken wrap

E



Lasagna

F



French-fry butty

G



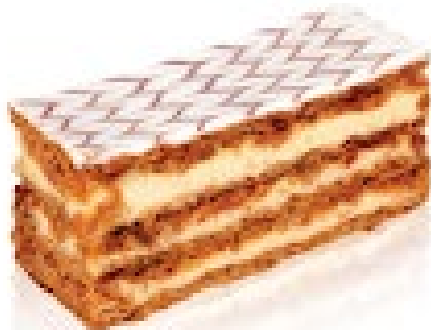
Hot dog

H



Beef and bean burrito

I



Napoleon tart

J



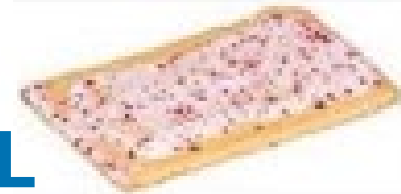
Ice-cream waffle

K



Frosted sugar cookie

L



Toaster pastry

# Define a sandwich

- ① **ON YOUR OWN** – based on the food items you identified as a sandwich, complete the following sentence:

A food item is a sandwich if...

- ② **FIND A PARTNER** – once everyone has created their own definition of a sandwich, find someone who has a different list of food items than you and tell them why they are **wrong** and you are **right**.

# Definitions

**Definition:** A ***definition*** is an agreement about the meaning of a particular (mathematical) word.

**Q:** What agreements would we have to make in order to formulate a definition for a sandwich?