MATH 421

The Theory of Single Variable Calculus

Introductions – Me

Instructor: Grace Work

Email: grace.work@wisc.edu

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

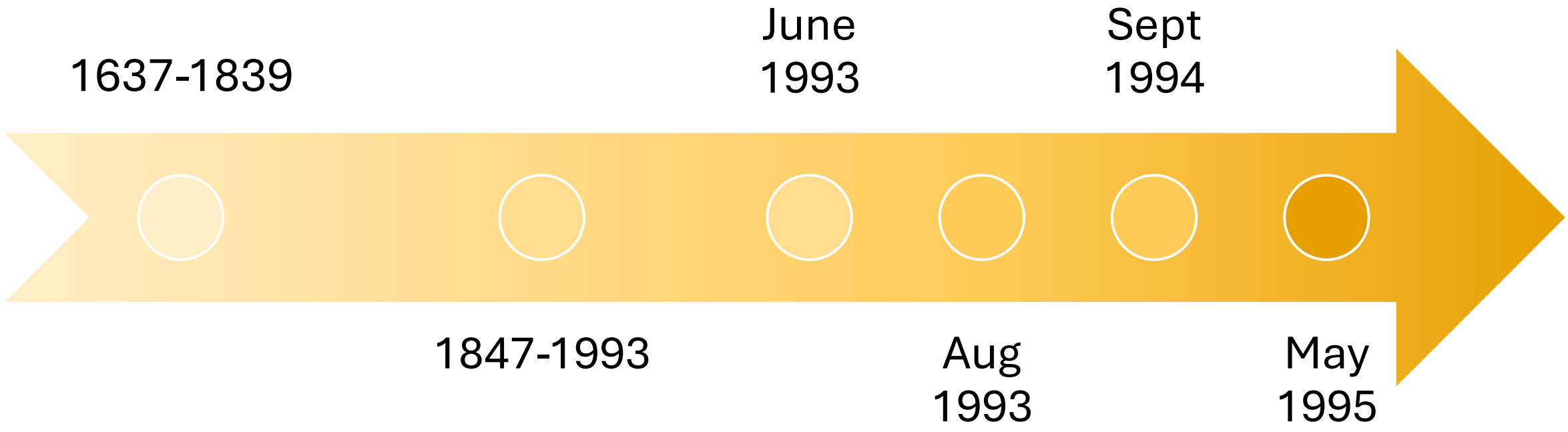
Once Upon a Time…

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

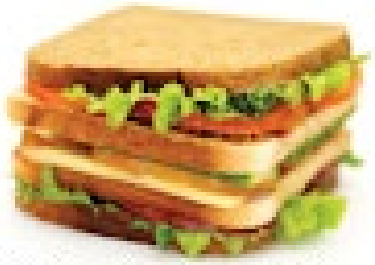
Definitions

Proposition

Corollary

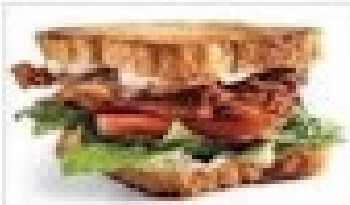
Activity: Is it a sandwich?

A



Triple-decker club

B



BLT

C

Submarine

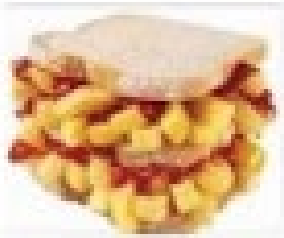
D

Chicken wrap

E

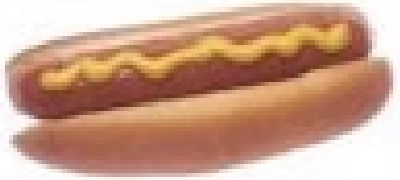
Lasagna

F



French-fry butty

G

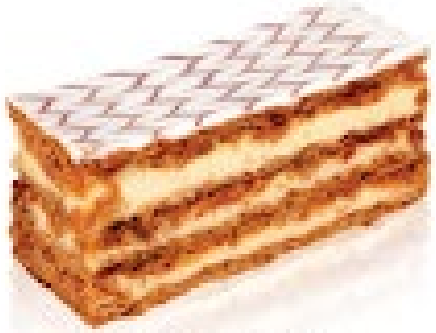


Hot dog

H

Beef and bean burrito

I



Napoleon tart

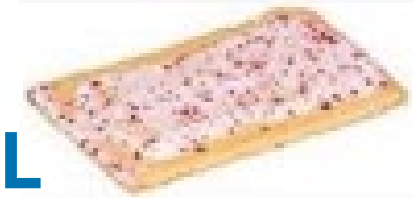
J

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?