6/03/20

Agenda for Math 5710 ♬ Meeting #4 ☻☺ 6/25/20 (8:00 a.m. – 9:10 a.m.)

1. Hello:

Brigham City:	Adam Blakeslee	Ryan Johnson	Tyson Mortensen	
Logan:	David Allen	Natalie Anderson	Kameron Baird	Stephen Brezinski
	Zachary Ellis	Adam Flanders	Brock Francom	Xiang Gao
	Ryan Goodman	Janette Goodridge	Hadley Hamar	Phillip Leifer
	Brittney Miller	Jonathan Mousley	Erika Mueller	Shelby Simpson
	Steven Summers	Matthew White	Zhang Xiaomeng	

2. Note the syllabus' activity list for today:

04: H/6/25	1. Deepen our conceptual understanding of functions. 2. Comprehend the role of functions in structure and practices of probability. 3.Take advantage of Quiz 04.

3. Raise issues and questions stimulated by our engagement in the following homework assignment:

A. Study our notes from Meeting #3 and comprehend Jim's sample responses to the Quiz #3 prompts that are posted on *Canvas*.

B*. Examine each of the following propositions, determine whether or not it is true, display your choice by circling either "T" or "F":

i. $(A = \{ 0, 1, 3 \} \wedge B = \mathbb{N}) \Rightarrow A - B = B - A$

T F

ii. $7 \in \mathbb{N} \times \mathbb{N}$

T F

iii. $\mathbb{N} \times \mathbb{N} \subset \mathbb{R} \times \mathbb{R}$

T F

iv. $\forall A \in \{ \text{sets} \}, A^c - A = V \Rightarrow A = \varnothing$

T F

v. $\forall A \in \{\text{sets}\},\ A \cap \varnothing = A$

T F

vi. $A, B \in \{\text{ sets }\} \Rightarrow A \cap B \subset A$

T F

vii. $A \in \{\text{ sets }\} \Rightarrow A \cap A^c = \varnothing$

T F

viii. $A \in \{\text{sets}\} \Rightarrow A \cup A^c = V$

T F

ix. $\forall A \in \{\text{sets}\},\ V - A^c = A$

T F

x. $(\mathbb{R} - (\mathbb{I} \cup \mathbb{Q})) \cap \{\ x \in \mathbb{R} : x \leq 0\ \} = [\,0, \infty\,)$

T F

xi. $V = \mathbb{Z} \Rightarrow \{\ \bar{}n : n \in \omega\ \}^c = \mathbb{N}$

T F

xii. $(7, 0) \in \mathbb{N} \times \mathbb{N}$

T F

C. Compare your responses to the 12 homework prompts from 14-B to the sample responses and accompanying explanations posted on *Canvas*.

D. Comprehend the entries from Lines #011–012 from our *Glossary* document.

4. Turn our attention to relations that are *functions*:

A. Discuss the idea of a function from one set to another or from a set to itself and note some familiar examples and non-examples.

B. Given $A, B \in \{\text{sets}\}$, clarify the meaning of the following shorthand notation:

"$f : A \to B$"

C.. Formulate a definition for *function*:

Given $A, B \in \{\text{sets}\}$, $f : A \to B$) $\Leftrightarrow$

D. Given $f : A \to B$, the meaning of the following and formulate definitions for each:

i. Domain of f

ii. Codomain of f

iii. Range of f

E. Examine the following propositions, determine whether or not it is true, display our choice by circling either "T" or "F"; prove our decision is correct:

$g \subseteq (\mathbb{Q} - \{^{-}1\}) \times \mathbb{Q} \ni g = \{(q, \frac{q}{q+1}) : q \in \mathbb{Q} - \{^{-}1\}\}) \Rightarrow$

$g : \mathbb{Q} - \{^{-}1\} \to \mathbb{Q} \ni \mathbb{Q} - \{^{-}1\}$ is the domain of $g \wedge \mathbb{Q}$ is the range of g

T F

5. Wrap our minds about the type of functions known as "*one-to-one functions*" or "*injections*."

A. Given $A, B \in \{\text{sets}\}$, discuss the idea of a one-to-one function from A to B.

B. Note: "$f : A \overset{1:1}{\to} B$" is read "$f$ is a one-to-one function from A to B." It's also read, "f is an *injection* from A to B."

C. Given $A, B \in \{\text{sets}\}$, share examples of $f \ni f : A \overset{1:1}{\to} B$.

D. Given $A, B \in \{\text{sets}\}$, share examples of relations that are not one-to-one functions from A to B (i.e., $f \subseteq A \times B \ni \overline{f : A \overset{1:1}{\to} B}$).

E. Formulate a definition for *one-to-one function* (i.e., *injection* or *injective function*):

Given $A, B \in \{\text{sets}\}$, $f : A \overset{1:1}{\to} B \Leftrightarrow$

F. Examine each of the following propositions, determine whether or not it is true, display our choice by circling either "T" or "F":

i. $g \subseteq (\mathbb{Q} - \{^{-}1\}) \times \mathbb{Q} \ni g = \{(q, \frac{q}{q+1}) : q \in \mathbb{Q} - \{^{-}1\}\} \Rightarrow g : \mathbb{Q} - \{^{-}1\} \overset{1:1}{\to} \mathbb{Q}$

T F

ii. $(s \subseteq (\mathbb{Q} \times \mathbb{Q}) \times \mathbb{Q} \ni s = \{((x, y), x \cdot y) : x, y \in \mathbb{Q} \}) \Rightarrow$

$s : \mathbb{Q} \times \mathbb{Q}) \xrightarrow{1:1} \mathbb{Q}$

T F

6. Wrap our minds about a type of functions known as "*onto functions*" or "*surjections*."

A. Given $A, B \in$ {sets}, discuss the idea of an onto function from A to B.

B. Note: "$f : A \xrightarrow{onto} B$"is read "$f$ is an onto function from A to B." It's also read, "f is a *surjection* from A to B."

C. Given $A, B \in$ {sets}, share examples of $f \ni f : A \xrightarrow{onto} B$.

D. Given $A, B \in$ {sets}, share examples of relations that are not onto functions from A to B (i.e., $f \subseteq A \times B \ni \overline{f : A \xrightarrow{onto} B}$).

E. Formulate a definition for *onto function* (i.e., *surjection* or *surjective function*):

Given $A, B \in$ {sets}, $f : A \xrightarrow{onto} B \Leftrightarrow$

F. Examine the following proposition, determine whether or not it is true, display our choice by circling either "T" or "F":

i. $g \subseteq (\mathbb{Q} - \{^{-}1\}) \times \mathbb{Q} \ni g = \{(q, \frac{q}{q+1}) : q \in \mathbb{Q} - \{^{-}1\}\} \Rightarrow$

$g : \mathbb{Q} - \{^{-}1\} \overset{onto}{\rightarrow} \mathbb{Q}$

T F

7. Take advantage of Quiz #04.

8. Complete the following assignment prior to Meeting #5:

A. Study our notes from Meeting #4 and comprehend Jim's sample responses to the Quiz #4 prompts that are posted on *Canvas*.

B*. Examine each one of the following propositions to determine whether or not its true; indicate your choice by circling either "T" or "F" then prove that the choice is correct (Please post your responses on the indicated Canvas Assignment link (as a PDF file.)):

i. $f : \mathbb{R} \to \mathbb{R} \ni f(x) = x^2 - 1 \Rightarrow f : \mathbb{R} \overset{1:1}{\rightarrow} \mathbb{R}$

T F

ii. $f: \mathbb{R} \to \mathbb{R} \ni f(x) = x^2 - 1 \Rightarrow f: \mathbb{R} \xrightarrow{onto} \mathbb{R}$

T F

iii. $g: \mathbb{R} \to \mathbb{R} \ni g(x) = \sqrt[3]{x} \Rightarrow g: \mathbb{R} \xrightarrow{1\text{-}1} \mathbb{R}$

T F

iv. $g: \mathbb{R} \to \mathbb{R} \ni g(x) = \sqrt[3]{x} \Rightarrow g: \mathbb{R} \xrightarrow{onto} \mathbb{R}$

T F

v. $h : \mathbb{R} \to \mathbb{R} \ni h(x) = \sqrt{x} \Rightarrow h: \mathbb{R} \xrightarrow{1:1} \mathbb{R}$

T F

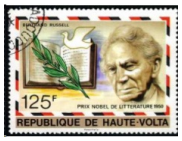
vi. $(s \subseteq (\mathbb{Q} \times \mathbb{Q}) \times \mathbb{Q} \ni s = \{ ((x, y), x \cdot y) : x, y \in \mathbb{Q} \}) \Rightarrow s: \mathbb{Q} \times \mathbb{Q} \xrightarrow{1:1} \mathbb{Q}$

T F

C. Compare your responses to the six homework prompts from Item #7B to the sample responses and accompanying explanations posted on *Canvas*.

D. Comprehend the entries from Lines #013–015 from our *Glossary* document.

9. And here are some quotes from Bertrand Russell (1877 – 1970):



The good life is one inspired by love and guided by knowledge.

War does not determine who is right - only who is left.

The whole problem with the world is that fools and fanatics are always so certain of themselves, and wiser people so full of doubts.

One should respect public opinion insofar as is necessary to avoid starvation and keep out of prison, but anything that goes beyond this is voluntary submission to an unnecessary tyranny.