6/03/20

Agenda for Math 5710 ♬ Meeting #3 ☻☺ 6/24/20 (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:

03: W/6/24	1. Continue to acquaint or re-acquaint ourselves with naive set theory. 2. Associate naive set theory with conventions of the language of probability. 3.Take advantage of Quiz 03.

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

A. Study Jim's sample responses to Quiz #02's prompts; study your notes from today's meeting.

B*. Examine each of the following propositions, determine whether or not it is true, display your choice by circling either "T" or "F"; for each write at least two sentences that explains why you decided that the proposition is true or why you decided that the proposition is false (Please post the resulting document (as a PDF file) on the indicated *Assignment* link of *Canvas*.) :

i. $\{\sqrt{3}\} \in \mathbb{R}$

T F

ii. $\sqrt{3} \in \{ \text{sets} \}$

T F

iii. $\{\sqrt{3}\} \in \{ \text{sets} \}$

T F

iv. $\sqrt{3} \in (-\infty, \infty)$

T F

v. $\exists!\, x \in \mathbb{R} \ni x^2 < x$

T F

vi. $[\,0, 36\,] \subseteq \{\, n^2 : n \in \mathbb{Z} \,\}$

T F

vii. $\{\, \mathbb{Q} \,\} \subseteq \mathbb{Q}$

T F

viii. $\mathbb{Q} \subseteq \mathbb{Q}$

T F

ix. $\varnothing \subseteq \mathbb{Q}$

T F

x. $\{\, n^2 : n \in \mathbb{Z} \,\} \subset \omega$

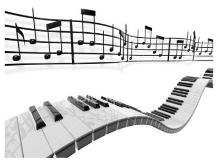
T F

C. Review and comprehend deeper than you comprehended previously Lines 004–010 of our Glossary.

D. Compare your responses to the homework prompts to those Jim posted in *Canvas* on the "Jim's Sample Responses to Homework Prompts" page.

4. Discuss that much of mathematics involves operations with pairs of sets or pairs of elements.

Share examples of operations – some generally considered non-mathematical (e.g., mixing the food lettuce with the food tomato to obtain the food salad) and others considered to be mathematical (e.g., take the integer 4 and add it to the integer $^{-}9$ to produce the integer $^{-}5$).



p	q	$p \wedge q$	$p \vee q$	$p \veebar q$	$\overline{p}$
T	T	T	T	F	F
T	F	F	T	T	F
F	T	F	T	T	T
F	F	F	F	F	T

5. Discuss the binary operation of *union* with pairs of elements of { sets }:

A. Given A, $B \in$ {sets}, clarify the idea of the *union* of A and B.

B. Given A, $B \in$ {sets}, note that "$A \cup B$" is read "the union of A and B."

C. Share examples of $A \cup B$ where A, $B \in$ { sets }

D. Share non-examples of $A \cup B$ where A, $B \in$ { sets }

E. Formulate a definition for *union of sets*:

Given A, $B \in$ {sets}, ($A \cup B = \{ x :$ $\})$

6. Discuss the operation of *intersection* with pairs of elements of { sets }:

A. Given A, $B \in$ {sets}, clarify the idea of the *intersection* of A and B.

B. Given A, $B \in$ {sets}, note that "$A \cap B$" is read "the intersection of A and B."

C. Share examples of $A \cap B$ where A, $B \in$ { sets }

D. Share non-examples of $A \cap B$ where A, $B \in$ { sets }

E. Formulate a definition for *intersection of sets*:

Given A, $B \in$ {sets}, $(A \cap B = \{x : \qquad\qquad\qquad\qquad \})$

7. Discuss the operation of *without* with pairs of elements of { sets }:

A. Given A, $B \in$ {sets}, clarify the idea of A *without* B.

B. Given A, $B \in$ {sets}, note that "$A - B$" is read "A without B."

C. Share examples of $A - B$ where A, $B \in$ { sets }

D. Share non-examples of $A - B$ where $A, B \in$ { sets }

E. Formulate a definition for *without*:

Given $A, B \in$ {sets}, ($A - B = \{ x :$ })

8. Discuss the operation of *complement* with an elements of { sets }:

A. Given $A \in$ {sets}, clarify the idea of *complement A*.

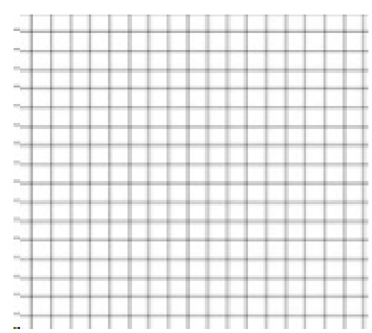
B. Given $A \in$ {sets}, note that "A^c " is read "the complement A" or "A complement."

C. Share examples of A^c where $A \in$ {sets}

D. Formulate a definition for *complement* of a set.

Given $A \in$ {sets}, $A^c = \{$ })

9. Discuss the operation of *cross product* or *Cartesian product* with pairs of elements of {sets}:



A. Given $A, B \in$ {sets}, clarify the idea of *cross product* of A to B.

B. Given $A, B \in$ {sets}, note that "$A \times B$" is read "the cross product of A to B" or "the Cartesian product of A to B."

C. Remind ourselves of the multitude of concepts with the name "(a, b)" where $a, b \in \mathbb{R}$ (e.g., $\{ x \in \mathbb{R} : a < x < b\}$ providing that $a < b$; the greatest common divisor of a and b providing that $a, b \in \mathbb{Z}$; or the ordered pair a, b in which a is the left-hand coordinate (i.e. the *abscissa*) and b is the right-hand coordinate (i.e., the *ordinate*)).

Note that we deal with the potential ambiguity by reading "(a, b)" in context; also note that as we discuss the operation of cross-product (i.e, Cartesian product) on { sets } we will mostly be referring to *ordered pair*.

D. Share examples of $A \times B$ where $A, B \in$ { sets }

E. Share non-examples of $A \times B$ where $A, B \in$ {sets}

F. Formulate a definition for *cross product*:

Given $A, B \in$ { sets }, ($A \times B = \{ \qquad\qquad\qquad\qquad \}$)

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

i. $A, B \in \{ \text{ sets } \} \Rightarrow A \times B = B \times A$

T F

ii. $\exists\, A, B \in \{ \text{ sets } \} \ni A \times B = B \times A$

T F

10. Suppose that $A, B \in \{ \text{ sets } \} \ni (A = \{ \mathbb{C}, \mathbb{I}, (^-1, 1), \mathbb{N}, \mathbb{R} \} \wedge B = \{ ^-1, 0, 1 \}$. Operating under that supposition, let's respond to the following prompts:

A. Verify that the following conjecture is true:

$$B \times A = \{ (^-1, \mathbb{C}), (^-1, \mathbb{I}), (^-1, (^-1, 1)), (^-1, \mathbb{N}), (^-1, \mathbb{R}), (0, \mathbb{C}), (0, \mathbb{I}), (0, (^-1, 1)), (0, \mathbb{N}), (0, \mathbb{R}), (1, \mathbb{C}), (1, \mathbb{I}), (1, (^-1, 1)), (1, \mathbb{N}), (1, \mathbb{R}) \}$$

B. Let the $R_1 =$
$\{ (^-1, \mathbb{C}), (^-1, \mathbb{R}), (0, \mathbb{C}), (0, (^-1, 1)), (0, \mathbb{R}), (1, \mathbb{C}), (1, \mathbb{N}), (1, \mathbb{R}) \}$

Comprehend why each one of the following propositions is true:

i. $R_1 \subseteq B \times A$

ii. $(b, a) \in R_1 \Rightarrow b \in a$

iii. $(b \in B \wedge a \in A \wedge (b, a) \notin R_1) \Rightarrow b \notin a$

C. Let the $R_2 = \{ (^-1, 0), (^-1, 1), (0, 1) \}$

Comprehend why each one of the following propositions is true:

i. $R_2 \subseteq B \times B$

ii. $(b_1, b_2) \in R_2 \Rightarrow b_1 < b_2$

iii. $(b_1, b_2 \in B \wedge (b_1, b_2) \notin R_2) \Rightarrow b_1 \nless b_2$

D. Let the R_3 =
$\{ (\mathbb{I}, \mathbb{C}), (\mathbb{I}, \mathbb{R}), ((^-1, 1), \mathbb{C}), ((^-1, 1), \mathbb{R}), (\mathbb{R}, \mathbb{C}), (\mathbb{N}, \mathbb{C}), (\mathbb{N}, \mathbb{R}) \}$

Comprehend why each one of the following propositions is true:

i. $R_3 \subseteq A \times A$

ii. $(a_1, a_2) \in R_3 \Rightarrow a_1 \subset a$

iii. $(a_1, a_2 \in A \wedge (a_1, a_2) \notin R_3) \Rightarrow a_1 \not\subset a_2$

11. Given $A, B \in$ {sets}, formulate a definition of a *relation from A to B*:

Given $A, B \in$ {sets}, (r is a *relation from A to B* $\Leftrightarrow$

12. Given $A \in$ {sets}, note what we mean by "r is a relation on A."

13. Take advantage of Quiz #03.

14. Complete the following assignment prior to Meeting #4:

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 to determine whether or not it is true; display your choice by circling either "T" or "F" (Please post the resulting document (as a PDF file) on the indicated *Assignment* link of *Canvas*.):

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

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.

15. Look at these pictures and ask yourself , “Why are these picture relevant to Math 5710?”:

Finding this broken cell phone was the best thing that ever happened to Chuck; now he could talk to himself freely without people staring.