

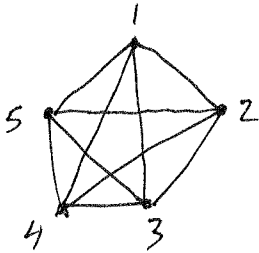
Name: Key

Math 221: Final Worksheet 1

Instructions: Complete this as review for the Test 1 material. It is not a standalone review, so be sure to also review old tests, quizzes, homework, etc, as well as the final theory review sheet.

1. If there are 20 people in a room and each person shakes every other person's hand, how many handshakes were performed? Nobody shakes hands twice, and shaking your own hand is strictly prohibited.

Ex: 5 hands



1st person shakes 4
 2nd shakes 3 more
 3rd shakes 2, 4th shakes 1
 5th already shook with all

Similarly, 1st shakes 19, 2nd shakes 18, etc.

$$19 + 18 + \dots + 1 = \frac{19(20)}{2} = 190$$

190 handshakes

2. Suppose you have an 80 average in this class. Since we are dropping 3 of your 10 quizzes, what would your new average be if your 3 lowest quiz grades were 40, 56, and 60?

Let q_1, q_2, \dots, q_{10} be in order highest to lowest.

$$\frac{q_1 + q_2 + \dots + q_7 + 80 + 56 + 40}{10} = 80$$

$$q_1 + q_2 + \dots + q_7 + 156 = 800$$

$$q_1 + q_2 + \dots + q_7 = 644$$

$$\text{Ave} = \frac{q_1 + q_2 + \dots + q_7}{7} = \frac{644}{7} = \mathbf{92}$$

3. Bill, Holly, Michael, and John all love spicy foods, but each have a preference of how it is made. There are 4 types of hot sauce on the table (arranged from hottest to least hot): Beyond Blistering Wing Sauce, Western Style Picante, Fresh Salsa, and Texas Pete. Can you determine who likes what sauce?

Clues:

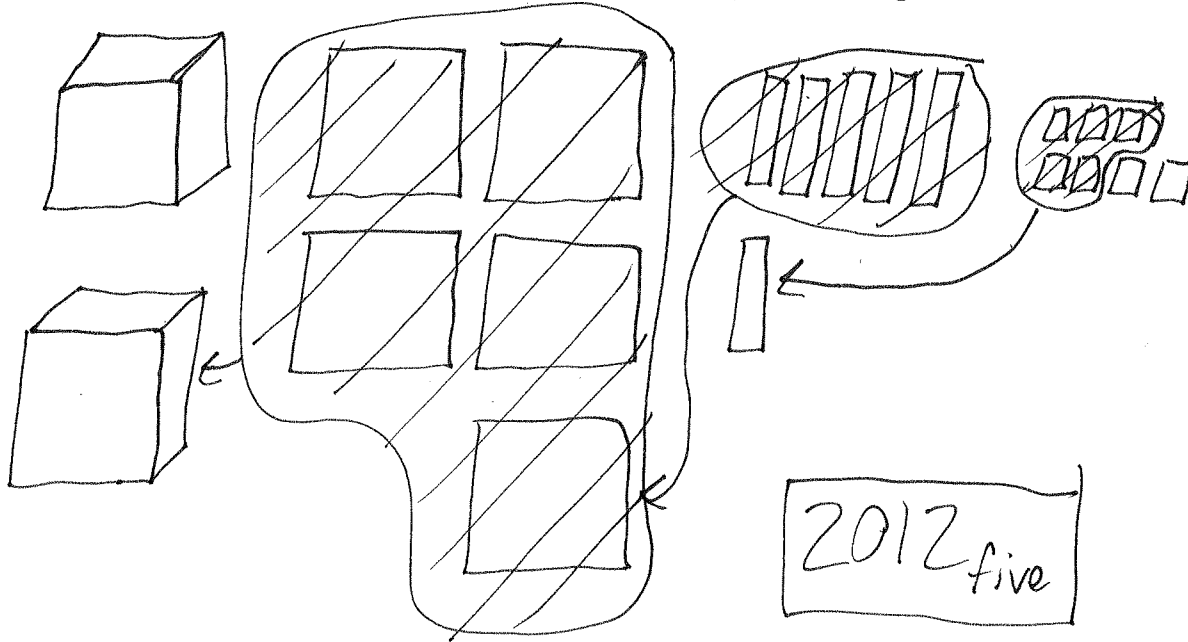
- Michael hates vinegar based sauces like the Beyond Blistering Wing Sauce and Texas Pete.
- John likes to make his own Fresh Salsa.
- Bill likes his hot sauce even hotter than Michael does.

	B	W	M	J
BBWS	O	X	X	X
WSP	X	X	O	X
FS	X	X	X	O
TP	X	O	X	X

Bill: Beyond Blistering
 Michael: Western Style

Holly: Texas Pete
 John: Fresh Salsa

4. Perform the exchanges to write the following situation as a number in base five: one block, four flats, five longs, and seven units. Draw a picture of what you are doing.



5. Write the first 25 base five numbers.

$1_{\text{five}}, 2_{\text{five}}, 3_{\text{five}}, 4_{\text{five}}, 10_{\text{five}}, 11_{\text{five}}, 12_{\text{five}}, 13_{\text{five}}, 14_{\text{five}}, 20_{\text{five}}, 21_{\text{five}},$
 $22_{\text{five}}, 23_{\text{five}}, 24_{\text{five}}, 30_{\text{five}}, 31_{\text{five}}, 32_{\text{five}}, 33_{\text{five}}, 34_{\text{five}}, 40_{\text{five}}, 41_{\text{five}},$
 $42_{\text{five}}, 43_{\text{five}}, 44_{\text{five}}, 100_{\text{five}}$

6. Convert 2401_{five} to base ten.

$$\begin{aligned}
 & 2(125) + 4(25) + 0(5) + 1 \\
 & = 250 + 100 + 0 + 1 \\
 & = \boxed{351}
 \end{aligned}$$

7. Convert the following base ten numbers to base five.

(a) 355_{ten}

$$\begin{array}{r} 125 \overline{) 355} \quad 2 \\ -250 \\ \hline 25 \overline{) 105} \quad 4 \\ -100 \\ \hline 5 \overline{) 5} \quad 1 \\ -5 \\ \hline 0 \end{array}$$

$$\boxed{2410_5}$$

(b) 382_{ten}

$$\begin{array}{r} 125 \overline{) 382} \quad 3 \\ -375 \\ \hline 25 \overline{) 7} \quad 0 \\ -0 \\ \hline 5 \overline{) 7} \quad 1 \\ -5 \\ \hline 2 \end{array}$$

$$\boxed{3012_5}$$

8. Fill in the following blanks with \in , \notin , \subseteq , or $\not\subseteq$. If the blank is filled with \subseteq , also tell whether you could also put \subset or $=$.

(a) $0 \notin \mathbb{N}$

(e) $\emptyset \subseteq \{0\}$ also \subset

(b) $4 \notin \{0, 1, 2, 3\}$

(f) $\pi \in \mathbb{R}$

(c) $\{1, 2, 3\} \not\subseteq \emptyset$

(g) $\{x \mid x \text{ is a perfect square}\} \subseteq \{x^2 \mid x \in \mathbb{Z}\}$
also $=$

(d) $\mathbb{N} \subseteq \mathbb{Z}$ also \subset

(h) $-6 \notin \{3x \mid x \in \mathbb{N}\}$

9. Given $U = \{1, 2, 3, \dots, 10\}$, $A = \{1, 3, 5, 7, 9\}$, and $B = \{2, 4, 5, 6, 7, 10\}$, find the following.

(a) $A \cap \overline{B}$

$$= \{1, 3, 5, 7, 9\} \cap \{1, 3, 8, 9\} = \boxed{\{1, 3, 9\}}$$

(b) $A - B$

$$\boxed{\{1, 3, 9\}}$$

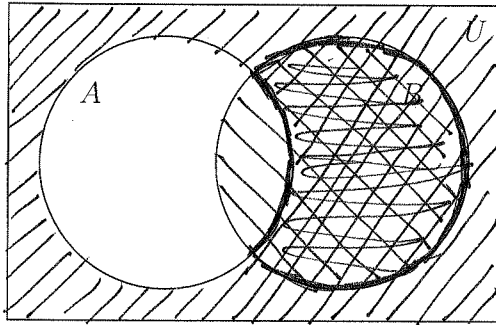
(c) $\overline{A \cup B}$

$$A \cup B = \{1, 2, 3, 4, 5, 6, 7, 9, 10\}$$

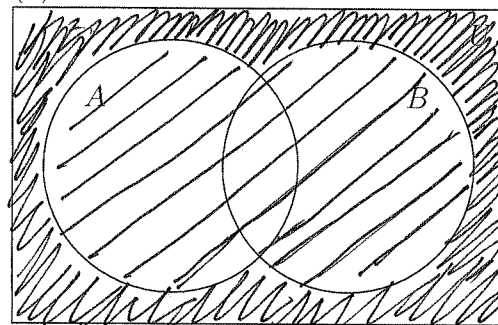
$$\overline{A \cup B} = \boxed{\{8\}}$$

10. Represent the following on a Venn Diagram.

(a) $\bar{A} \cap B$

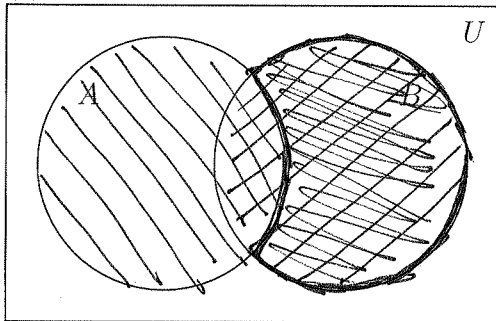


(b) $\overline{A \cup B}$

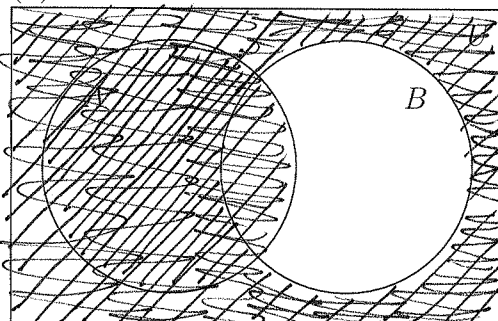


Shade outside

(c) $B - A$



(d) $A \cup \bar{B}$



Shade everything with lines

11. Two of the sets above are equal. Based on the Venn diagrams, which are the same? Explain.

(a) and (c) have the same final shading. Since these sets are ^(A and B) arbitrary, $\bar{A} \cap B = B - A$.

12. Jimmy is learning the 4 step problem solving process and claims that the 4th step about looking back is pointless. He says that he already got the answer, so he shouldn't have to keep thinking about the problem. Considering the various parts of the look back step, how would you convince this student that he needs to look back every time?

One important part is to make sure that he answered the question. He may not have the answer like he thinks. Also, the problem solving process is intended to make him a good problem solver. I would explain to him how connecting different problems together will make future problems easier to solve.