Name: _____

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.

2. Suppose you have an 80 quiz average in this class. Since we are dropping 3 of your 12 quizzes, what would you new average be if your 3 lowest quiz grades were 40, 56, and 60?

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.

   Bill: _____ Holly: _____

   Michael: _____ John: _____

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.

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

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

   (a) 355_{ten}

   (b) 382_{ten}

8. Fill in the following blanks with $\in$, $\notin$, $\subseteq$, or $\nsubseteq$. If the blank is filled with $\subseteq$, also tell whether you could also put $\subset$ or $=$.

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

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

   (c) $\{1, 2, 3\} \_\_ \varnothing$

   (d) $\mathbb{N} \_\_ \mathbb{Z}$

   (e) $\varnothing \_\_ \{0\}$

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

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

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

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

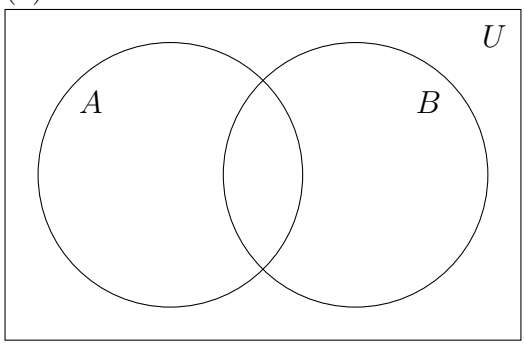
   (a) $A \cap \overline{B}$

   (b) $A - B$

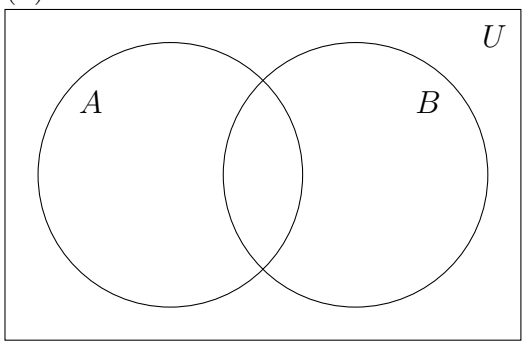
   (c) $\overline{A \cup B}$

10. Represent the following on a Venn Diagram.

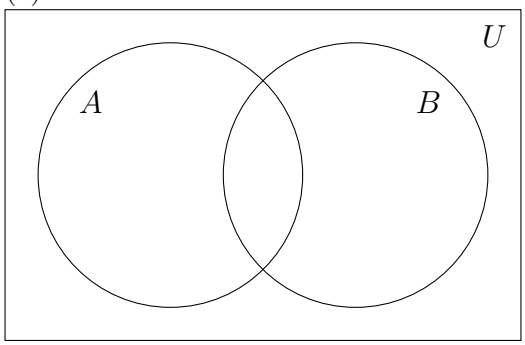
(a) $\overline{A} \cap B$



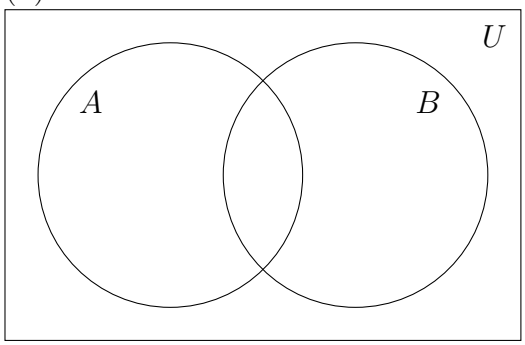
(b) $\overline{A \cup B}$



(c) $B - A$



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



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

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?