DISCRETE STRUCTURES, SPRING 2017 - PROBLEM SET

Name: _____

Use this worksheet as the cover sheet for your write-up: write your name on this page, and staple this sheet to the front of your homework packet.

You will receive no credit for submitting solutions that the grader cannot read and understand—be sure to write legibly!

Problem 1. Use your intuition to make a guess as to whether the following statements are true or false. In each case, argue why it is true, or give a counter example if you think the statement is false.

(1) Whenever $A \subseteq B$ and $B \subseteq C$, then $A \subseteq C$.
(2) Whenever $A \subseteq B$ and $C \subseteq B$, then $A \subseteq C$.
(3) Whenever $A_1 \subseteq A_2 \subseteq A_2 \subseteq \cdots \subseteq A_n$ and also $A_n \subseteq A_1$, then $A_i = A_j$ for all $i \neq j$.

Problem 2. If A, B, and C are nonempty sets, draw the Venn diagrams for each of the following sets:

(1) $(A \bigcup B \bigcup C) - (A \bigcap B \bigcap C)$.
(2) $(A \bigcup B \bigcup C) - [(A \bigcap B) \bigcup (A \bigcap C) \bigcup (B \bigcap C)]$.
(3) If $A \subseteq B$ and $A \bigcap C = \emptyset$, $B \bigcap C \neq \emptyset$, draw $(B \bigcap A') - C$.

Problem 3. Show the following relations for nonempty A and B:

(1) $A \bigcap B \subseteq A$ and $A \bigcap B \subseteq B$.
(2) Let X be a set such that $X \subseteq A$ and $X \subseteq B$, show $X \subseteq A \bigcap B$
(3) $A \bigcap A = A$.

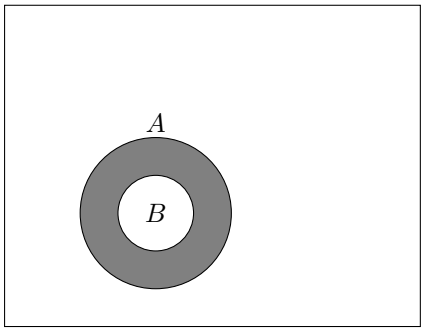
Problem 4. Show the following relations for sets A and B:

(1) $A \subseteq A \bigcup B$.
(2) $B \subseteq A \bigcup B$.
(3) $A \bigcup A = A$.
(4) $A + B \subseteq A \bigcup B$.

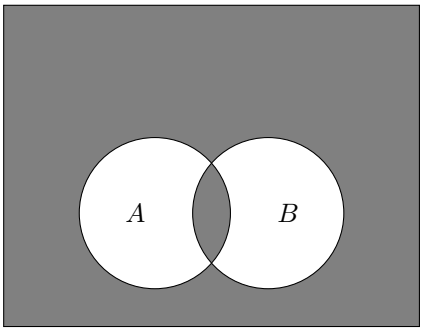
Problem 5. Given the following diagrams of sets A, B, C, identify the shaded regions symbolically with sets operations:

Date: Friday January 27th, 2017.

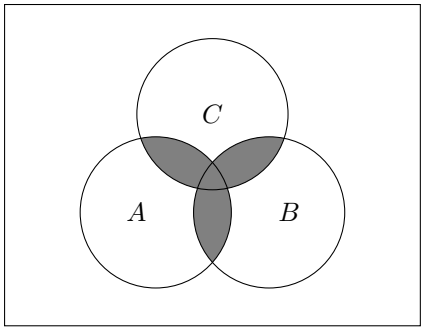
(a)



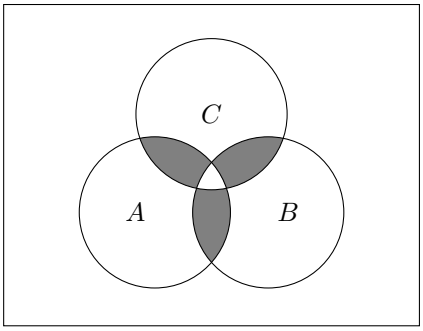
(b)



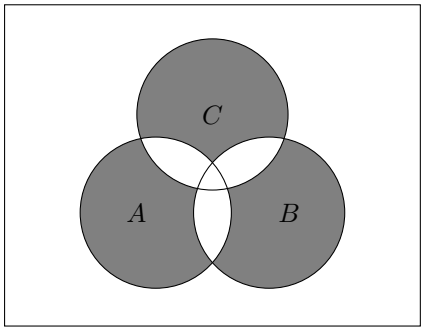
(c)



(d)



(e)



(f)