FINITE MATH, FALL 2016 - PROBLEM SET 3

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. Find the present value of each ordinary annuity:

(1) Payments of $890 each year for for 16 years at 6% compounded annually.
(2) Payments of $1400 each year for 8 years at 6% compounded annually.

Problem 2. Find the lump sum deposited today that will yield the same total amount as payments of $10000 at the end of each year for 15 years at each of the given interests rates.

(1) 4% compounded annually.
(2) 6% compounded annually.

Problem 3. Find the monthly payments necessary to amortize a loan of $199000 at 7.01% for 25 years. In addition calculate the total payment and the total amount of interest paid.

Problem 4. We want to buy a house for $285000. We pay $60000 down and then we take out a mortgage at 6.5% on the remaining balance. Find the monthly payments and the total amount of interest we will pay if the length of the mortgage is:

(1) 15 years.
(2) 20 years.
(3) 25 years.

Problem 5. If $A = \{\{a\}, a\}$, and $\mathcal{P}$ is the powerset, find
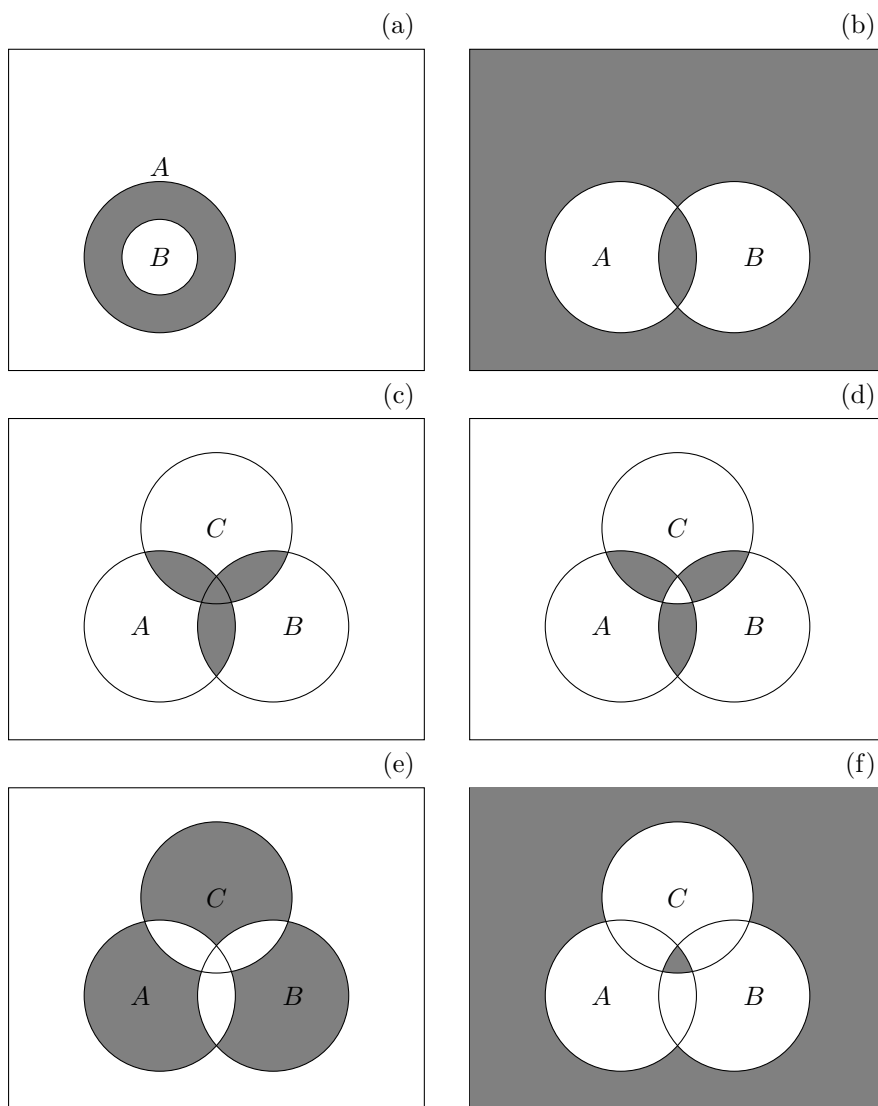
(1) $|\mathcal{P}(A)|$
(2) $\mathcal{P}(A)$
(3) is $a \in A$?
(4) is $a \subset A$?

Problem 6. If A, B, C are sets, which of the following are true or false, explain your answer:

(1) If $A \neq B$ and $B \neq C$, then $A \neq C$
(2) If $A \subset B$ and $B \subset C$, then $C \subset A$
(3) If $A \subset B$ and $B \in C$ then $A \notin C$

Problem 7. Given the following diagrams of sets A, B, C, identify the shaded regions symbolically with sets operations:

(a)

(b)

(c)

(d)

(e)

(f)

Problem 8. Assume that U is the universe, $\bigcup$ is the union operator, and $\bigcap$ is the intersection operator. Draw the Venn diagrams of the following:

(1) $A' \bigcup A$
(2) $(U \bigcap A) \bigcup (U \bigcap B)$
(3) If $A \subset C$, $B \bigcap C \neq \emptyset$, and $A \bigcap B = \emptyset$, draw $A' \bigcap (B' \bigcap C)$
(4) **Bonus:** If $A \subset B \subset C$, draw $(A' \bigcap B) \bigcup C'$

Problem 9. Show by the use of Venn diagrams whether or not the following equality holds:

$$(A - B) - C = (A - C) - (B - C)$$

Breaking the left and right hand side into sub-diagrams might be helpful in visualizing what each side produces.

Bonus: Prove the above.