

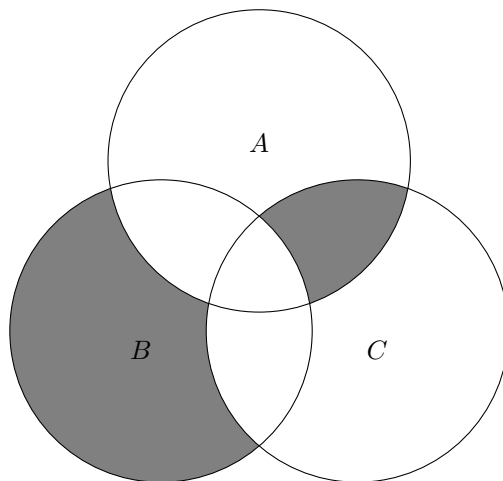
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 CS1200 Fall 2018
 Homework 5
 Due: Wednesday 11/07/18

1. Assuming P and Q are defined for the same universe use truth trees to determine whether the argument is valid. If it is not valid construct a counterexample.
2. Draw a Venn diagram to show the relationships among the sets.
3. Write a Python program to verify your answers.
4. Simplify the expression $(A \cup ((B \cap C)' \cup (A' \cap C')'))'$ using the laws of Boolean algebra.
5. Write down the set $\{x, y\} \times \{f, h\} \times \{9, 3, 6\}$.
6. (a) List all the elements of $2^{\{0,1,2\}}$ and $2^{\{a,b,c,d\}}$.

$\{\{\}, \{0\}, \{1\}, \{2\}, \{0, 1\}, \{0, 2\}, \{1, 2\}, \{0, 1, 2\}\}$
 $\{\{\}, \{a\}, \{b\}, \{c\}, \{d\}, \{a, b\}, \{a, c\}, \{a, d\}\}, \{b, c\},$
 $\{b, d\}, \{c, d\}, \{a, b, c\}, \{a, b, d\}, \{a, c, d\}, \{b, c, d\}, \{a, b, c, d\}\}$

(b) Write a Python program to verify your answers in (a).

7. Draw a Venn diagram of $(A \# B) \cap (B \# C)$.



8. Assuming P, Q and R are defined for the same universe use truth trees to decide if the following argument is valid. If it is not valid show all the counterexamples that can be found using the truth tree.