1 Taking ECE 3100 until A+

a. A good sample space is the set of numbers $\Omega = \{1, 2, 3, 4, 5, 6...\}$ where the number represents that amount of times the student took ECE 3100 to get an A+.

b. n is the event that you get an A+ by the nth try.

c. ∞ is the event that you continue taking ECE 3100 forever.

2 Constructing a sample space

a. A good sample space is the unit square, $\Omega = \{(x, y)|0 \leq x \leq 1, 0 \leq y \leq 1\}$

b. The event is a portion of the unit square,
$\Omega = \{(x, y)||x| + |y| \leq a, 0 \leq x \leq 1, 0 \leq y \leq 1\}$

3 Events and set operations

$A = \{2, 4, 6\}$ $B = \{4, 5, 6\}$
$(A \cup B)^c = A^c \cap B^c = \{1, 3, 5\} \cap \{1, 2, 3\} = \{1, 3\}$
$(A \cap B)^c = A^c \cup B^c = \{1, 3, 5\} \cap \{1, 2, 3\} = \{1, 2, 3, 5\}$

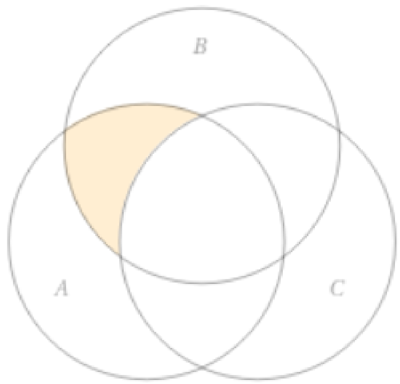
4 Events and set operations

a. $A^c = (A^c \cap B) \cup (A^c \cap B^c) = A^c \cap (B \cup B^c) = A^c \cap \Omega = A^c$
$B^c = (A \cap B^c) \cup (A^c \cap B^c) = (A \cup A^c) \cap B^c = \Omega \cap B^c = B^c$

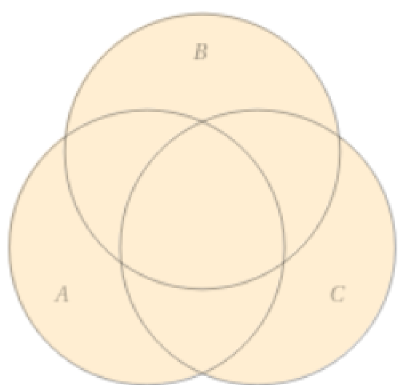
b. $(A \cap B)^c = (A^c \cap B) \cup (A^c \cap B^c) \cup (A \cap B^c) = (A \cup B^c)^c \cup (A \cup B)^c \cup (A^c \cup B)^c =$
$((A \cup B^c) \cap (A \cup B))^c \cup (A^c \cup B)^c = (A \cap (B^c \cup B))^c \cup (A^C \cup B)^c = (A \cap \Omega)^c \cup (A^c \cup B)^c =$
$A^c \cup (A^c \cup B)^c = (A \cap (A^c \cup B))^c = ((A \cap A^c) \cup (A \cap B))^c = (\emptyset \cup (A \cap B))^c = (A \cap B)^c$

c. $A = \{1, 3, 5\}$ $B = \{1, 2, 3\}$,
$(\{1, 3, 5\} \cap \{1, 2, 3\})^c = (\{1, 3\})^c = \{2, 4, 5, 6\} = (\{2, 4, 6\} \cap \{1, 2, 3\}) \cup (\{2, 4, 6\} \cap \{4, 5, 6\}) \cup$
$(\{1, 3, 5\} \cap \{4, 5, 6\}) = \{2\} \cup \{4, 6\} \cup \{5\} = \{2, 4, 5, 6\}$

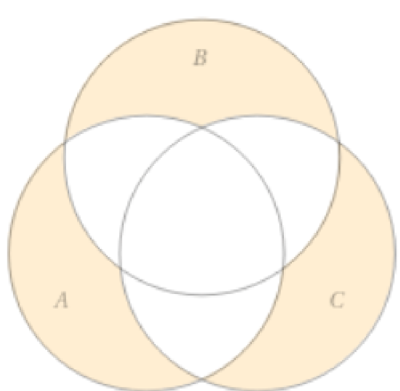
5 Events and Venn Diagram



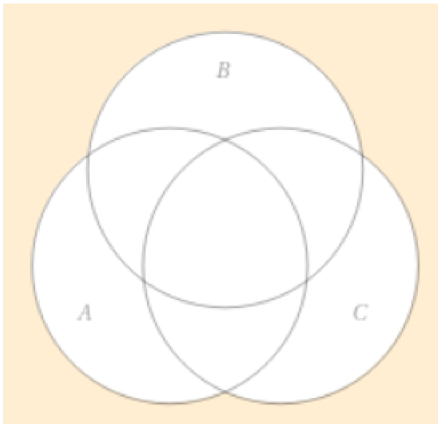
a. $A \cap B \cap C^{c}$



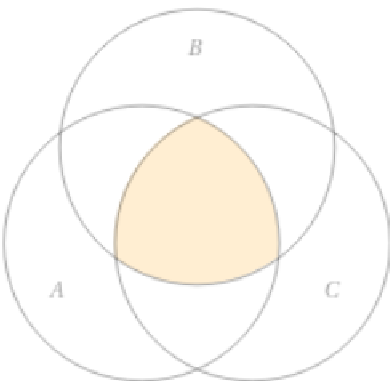
b. $A \cup B \cup C$



c. $(A \cup B \cup C) \cap (A \cap B \cap C)^{c} \cap (A \cap B)^{c} \cap (A \cap C)^{c} \cap (B \cap C)^{c}$



d. $(A \cup B \cup C)^c$



e. $A \cap B \cap C$