Set Identities with Intuitive Explanations

Law Type	**Identity**	**Intuitive Explanation**
Identity Laws	$A \cup \emptyset = A$	Adding no one doesn't change the guest list.
	$A \cap U = A$	Everyone at the party who is also in the universe is still just everyone at the party.
Domination Laws	$A \cup U = U$	Inviting everyone overrides your list.
	$A \cap \emptyset = \emptyset$	No one is in both the party and an empty room.
Idempotent Laws	$A \cup A = A$	Adding the same people twice doesn't change the crowd.
	$A \cap A = A$	Checking who's in the party and also in the party? Still the party!
Complementation Laws	$A \cup A^c = U$	The party plus everyone not at the party = everyone.
	$A \cap A^c = \emptyset$	No one is both in and not in the party.
	$U^c = \emptyset$	Nothing is outside the universe.
	$\emptyset^c = U$	Everything is outside the empty set.
Double Complement	$(A^c)^c = A$	Not not in the party means you're in the party.
Commutative Laws	$A \cup B = B \cup A$	Order of invitations doesn't matter.
	$A \cap B = B \cap A$	Order doesn't affect who's on both lists.
Associative Laws	$(A \cup B) \cup C = A \cup (B \cup C)$	Grouping doesn't matter when uniting sets.
	$(A \cap B) \cap C = A \cap (B \cap C)$	Same for intersections.
Distributive Laws	$A \cap (B \cup C) = (A \cap B) \cup (A \cap C)$	Filter A through both groups and combine.
	$A \cup (B \cap C) = (A \cup B) \cap (A \cup C)$	Merge A with both, then find overlap.
De Morgan's Laws	$(A \cup B)^c = A^c \cap B^c$	Not in A or B = in neither.
	$(A \cap B)^c = A^c \cup B^c$	Not in both = missing at least one.
Absorption Laws	$A \cup (A \cap B) = A$	A swallows the overlap.
	$A \cap (A \cup B) = A$	A is already inside the union.