ProofSpace Comprehension Quiz

Sets

Operations and Identities

1 Write out each of the following sets.

Let $A = \{5, 6, 7, 8, 9\}$.
Let $B = \{x \in \mathbb{N} \text{ such that } 3 \mid (x + 1)\}$.
Let the universal set U be $\mathbb{Z}$.

a) $B =$ _____.

b) $A \cup B =$ _____.

c) $A \cup \mathbb{N} =$ _____.

d) $B \cup \mathbb{N} =$ _____.

e) $A \cap B =$ _____.

f) $A \cap \mathbb{N} =$ _____.

g) $B \cap \mathbb{N} =$ _____.

h) $A \times A =$ _____.

i) $A - B =$ _____.

j) $B - U =$ _____.

k) $\mathbb{N} - A =$ _____.

l) $B - A =$ _____.

m) $A^c =$ _____.

n) $B^c =$ _____.

o) $\emptyset^c =$ _____.

p) $B^c =$ _____.

q) $\mathbb{N}^c =$ _____.

r) $(A \cup B \cap \mathbb{N}) =$ _____.

s) $(A \cup B)^c =$ _____.

2 For each equivalence in Column A, choose the appropriate identity used from Column B. Each entry in Column B may be used no more than once.

Column A

1) $(A \cup B) \cap (A \cup B) = A \cup B$ _____

2) $(A \cup B) \cap (C \cup A) = (C \cup A) \cap (A \cup B)$ _____

3) $(A \cup B)^{c^{c^c}} = (A \cup B)^c$ _____

4) $(A \cup B)^c = A^c \cap B^c$ _____

5) $U^c = \emptyset$ _____

Column B

a) Associative Laws

b) Commutative Laws

c) Complement Basic Properties

d) Complement Empty Set and Universal Set Properties

e) DeMorgan's Laws

f) Distributive Laws

g) Empty Set Properties

h) Idempotent Laws

i) Subsets and Complements

j) Universal Set Complements

k) Universal Set Properties

3 Which of the following is equivalent to $A \cup (B \cap C)$?

a) $A \cup B \cap C$.

b) $A \cap (B \cup C)$.

c) $(A \cup B) \cap (A \cup C)$

d) None of the above options.

4 Which of the following is equivalent to $A \cup \emptyset$?

a) $\emptyset$

b) A

c) A^c

d) None of the above options.