

Q1 a) $(1,1), (2, \frac{1}{2}), (-1,1)$

b) $\emptyset, \mathbb{Z}, 2\mathbb{Z} = \{\dots, -2, 0, 2, 4, \dots\}$

c) $\emptyset, \mathbb{Z}, \{0\}$.

d) $\{\emptyset\}, \emptyset, \{\mathbb{Z}\}$.

e) $(3,4,5) (5,12,13) (8,15,17)$

Q2 c) is the counterexample.

Q3 Thm The product of two odd numbers is odd.

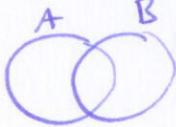
Proof Let x and y be odd integers. Then $x = 2a+1$ and $y = 2b+1$ for integers a and b . $xy = (2a+1)(2b+1) = 4ab + 2a + 2b + 1 = 2(2ab + a + b) + 1$, which is odd, as required. $\square$.

Q4 $P(\{\emptyset\}) = \{\emptyset, \{\emptyset\}\}$.

$P(P(\{\emptyset\})) = \{\emptyset, \{\emptyset\}, \{\{\emptyset\}\}, \{\emptyset, \{\emptyset\}\}\}$.

Q5 No. $\textcircled{A \cup B}$ $\textcircled{C}$ explicit counterexample: $A = \{1\}, B = \{1\}, C = \{2\}$.

Q6 a) T. b) vacuously true c) F.

Q7  $|A| = a$ $|B| = b$ $|A \cup B| = c = |A| + |B| - |A \cap B|$
so $|A \cap B| = a + b - c$

a) $|B - A| = |B| - |B \cap A| = b - ((a+b) - c) = c - a$.

b) ac

c) 2^{a+b-c}

Q8

Q8

A	B	C	A says. #T ≥ 1
T	T	T	T
T	T	F	T
T	F	T	T
T	F	F	T
F	T	T	T
F	T	F	T
F	F	T	T
F	F	F	F

B says
A is lying
F } # Bis T.
F }

C says
B is lying.

T ← only one solution
T # C is F A B C
 T F T.

A is F.

T # B is F.

Q9 Inconsistent statement, D is not either a T or F.