

Name: _____ Date: _____

Quiz 4 Median 8.75/10

- 1) Verify the stated identity

$$\begin{aligned}(A \cap B \cap C^c) \cup (A \cap B^c \cap C) &= A \cap (B \Delta C) \\ &= (A \cap (B \cap C^c)) \cup (A \cap (B^c \cap C)) \text{ by associative} \\ &= A \cap ((B \cap C^c) \cup (B^c \cap C)) \text{ by distributive} \\ &= A \cap ((B \setminus C) \cup (C \setminus B)) \text{ by set difference} \\ &= A \cap (B \Delta C) \text{ by symmetric difference}\end{aligned}$$

- 2) Write the negation of the given statement symbolically and determine whether the original or the negation is true.

There is a natural number n such that, for every real number x , x^n is nonnegative.

original:

$$\exists n \in \mathbb{N} \text{ such that } \forall x \in \mathbb{R}, x^n \geq 0.$$

negation:

$$\forall n \in \mathbb{N}, \exists x \in \mathbb{R} \text{ such that } x^n < 0.$$

The original statement is true.

- 3) Compute $950 - 857$ using 2's complement addition. Use 12 bits for your word size. Note the 950 is 3B6 in hexadecimal and positive 857 is 359 in hexadecimal. Show your work and check your answer.

$$\begin{array}{r} 0011\ 1011\ 0110 \\ + \underline{1100\ 1010\ 0111} \\ \hline \underline{1}\ 0000\ 0101\ 1101 \\ \Rightarrow 1 \times 2^6 + 1 \times 2^4 + 1 \times 2^3 + 1 \times 2^2 + 1 \times 2^0 = 64 + 16 + 8 + 4 + 1 = 93 \checkmark \end{array}$$