

CSci 243 Homework 4

My name

- (7 points) Determine whether these statements are true or false.
 - $\emptyset \in \{\emptyset\}$
 - $\emptyset \in \{\emptyset, \{\emptyset\}\}$
 - $\{\emptyset\} \in \{\emptyset\}$
 - $\{\emptyset\} \in \{\{\emptyset\}\}$
 - $\emptyset \subset \{\emptyset, \{\emptyset\}\}$
 - $\{\emptyset\} \subset \{\emptyset, \{\emptyset\}\}$
 - $\{\{\emptyset\}\} \subset \{\emptyset, \{\emptyset\}\}$
- (4 points) Is each of these sets the power set of a set, where a and b are distinct elements? If yes, give the original set.
 - \emptyset
 - $\{\emptyset, \{a\}\}$
 - $\{\emptyset, \{a\}, \{\emptyset, a\}\}$
 - $\{\emptyset, \{a\}, \{b\}, \{a, b\}\}$
- (10 points) For sets A , B , and C , prove that $(B - A) \cup (C - A) = (B \cup C) - A$
 - by showing each side is a subset of the other side
 - by using a membership table
- (5 points) Find these values.
 - $\lfloor 1.1 \rfloor$
 - $\lceil 1.1 \rceil$
 - $\lfloor -0.1 \rfloor$
 - $\lceil -0.1 \rceil$
 - $\lfloor \frac{1}{2} + \lceil \frac{1}{2} \rceil \rfloor$
- (8 points) Determine whether each of these functions $f : \mathbb{Z} \rightarrow \mathbb{Z}$ is one-to-one, onto, both, or neither.
 - $f(n) = n + 1$
 - $f(n) = n^2 + 1$.
 - $f(n) = n^3$
 - $f(n) = \lceil \frac{n}{2} \rceil$
- (6 points) Prove that $\lceil x + n \rceil = \lceil x \rceil + n$, where x is a real number and n is an integer. (Hint: note the property of ceiling function: $\lceil x \rceil = n$ if and only if $n \leq x < n + 1$).