

1. What is the cardinality of the following sets
 - (a) $\{1, 3, 4, 7\}$
 - (b) $\{2, \{a, c\}, \emptyset\}$
 - (c) $\{x | x \in \mathbb{Z} \text{ and } 7 \leq x^2 \leq 100\}$
 - (d) $\{\emptyset, \{\emptyset\}, \text{red}, \text{green}, \text{blue}, \begin{bmatrix} 1 & 7 & 10 \\ 0 & 1 & 2 \end{bmatrix}\}$
2. Show $\mathbb{N} \subseteq \mathbb{Z} \subset \mathbb{R}$.
3. Does $A \cap C = B \cap C$ imply $A = B$ prove your answer.
4. Show $(A - B) - C \subset A - C$.
5. Use symbolic notation to write the definition of $A \subset B$.
6. Is the function $f : \mathbb{Z} \rightarrow \mathbb{N}$ defined by $f(x) = x^2 - x$ one to one? Justify your answer.
7. Is the function $f : \text{students in CS247} \rightarrow \text{eyecolor}$ defined choosing the eye color of the input student onto? Justify your answer.
8. Use symbolic notion to write the definition of injective, surjective, bijective.
9. Find the solution of the recurrence relation $a_n = a_{n-1} + 2n$, $a_0 = 1$,
10. Compute $\sum_{j=1}^{20} j^2 - (j-1)^2$
11. Show for matrices A , B , and C that $A(B+C) = AB+BC$ as long as the operations are well defined.
12. Show for matrices A , B , and C that $(AB)C = A(BC)$.