

1. Give a precise definition what it means for a function f be a bounded function with domain S . Give a precise definition what it means for a function f be an unbounded function with domain S .
2. Let A and B be sets and f a function. Prove that $f^{-1}(A \cap B) = f^{-1}(A) \cap f^{-1}(B)$.
3. Negate:
 - (a) I came sad, but I am leaving happy.
 - (b) Everybody loves somebody sometimes.
4. Using statements about membership prove or disprove the following statement about sets A , B , and C : $(A \cap B) - C = (A - C) \cap (B - C)$.
5. Solve the inequality: $|2x - 1| \leq |x - 3|$.
6. Let $\langle a \rangle$ be a sequence satisfying $a_0 = 0$, $a_1 = 1$, and $a_{n+1} = 3a_n - 2a_{n-1}$ for $n \in \mathbb{N}$. Prove that $a_n = 2^n - 1$ for all $n \in \mathbb{N}$.
7. Consider the statement: "A number is divisible by 3 if the sum of its digits is divisible by 3." State this implication using "is necessary condition for".
8. Find a statement that is logically equivalent to $\neg(P \Leftrightarrow Q)$ and that contains neither \Leftrightarrow nor \Rightarrow .