Problem 1:
Theorem: R is an equivalence relation on all sets when ARB if and only if the exist a bijection from A to B.

Problem 2: Given that \( A = \{ a, b, c, d \} \) and the relation \( R \) is defined on A to be
\[ R = \{(a, a), (b, b), (c, c), (b, c), (c, a)\} \]
a) Add the minimal number of elements to \( R \) so that \( R \) will be reflexive.
b) Is \( R \) anti-symmetric? If not then make the minimal additions or deletions of elements so that \( R \) is anti-symmetric.
c) Add the minimal number of elements to \( R \) so that \( R \) is symmetric.
d) Add the minimal number of elements to \( R \) so that \( R \) is transitive.

Problem 3:
Given the set \( A = \{ 2, 3, 4, 6, 12, 16, 18 \} \), draw the Hasse Diagram that illustrates the partial order relation \( R \) that is defined as follows. For all elements \( a \) and \( b \) in \( A \), \( aRb \) if and only if \( a \mid b \).

Problem 4:
Verify that \( R \) is a partial order on all sets when ARB if and only if \( A \subseteq B \).

Problem 5: Big O definition:
If \( f(x) \) and \( g(x) \) are real valued functions then \( f(x) \) is Big O of \( g(x) \) iff there exist constants \( C \) and \( K \) so that \( |f(x)| \leq C|g(x)|, \forall x > K \)
Let \( f(x) = 2x^2 + 3x + 6 \) and \( g(x) = x^2 \) and verify using the definition above that \( f(x) \) is Big O of \( g(x) \).