1. Let $A = \{1, 3, 5, 7, 9, 11\}$ and $B = \{2, 4, 5, 7, 11, 12, 14\}$. Define $f : A \to B$ by $f(1) = 5, f(3) = 4, f(5) = 12, f(7) = 4, f(9) = 14, f(11) = 4$. What is $f[\{5, 7, 11\}]$? $f^{-1}[\{5, 7, 11\}]$? $f^{-1}[\{2, 11, 12\}]$?

2. Let $f : \mathbb{Z} \to \mathbb{N}$ be defined by $f(x) = x^2$. What is $f[\{-3, -1, 2, 4\}]$? $f^{-1}[\{-2, 0, 4, 9\}]$? $f[f^{-1}[\{0, 1, 2, 3, 4\}]]$? $f^{-1}[f[\{0, 1, 2, 3, 4\}]]$?

3. Suppose that $f : A \to B$ is one-to-one and $C \subseteq A$. Show that $f^{-1}[f[C]] = C$.

4. Suppose that $f : A \to B$ is onto and $D \subseteq B$. Show that $f[f^{-1}[D]] = D$.

5. Suppose that $f : A \to B$ is a function. What can you say about $|A|$ compared to $|B|$? Recall that $|A|$ denotes the number of elements of the set $A$.

6. Suppose that $f : A \to B$ is onto. What can you say about $|A|$ compared to $|B|$?

7. Suppose that $f : A \to B$ is a function. What can you say about $|A|$ compared to $|B|$?

8. Suppose that $|A| = 4$ and $|B| = 3$. How many functions are there from $A$ to $B$? How many from $B$ to $A$?

9. Suppose that $|A| = 4$ and $|B| = 5$. How many one-to-one functions are there from $A$ to $B$? How many onto functions from $A$ to $B$?

10. (challenge) Suppose $|A| = 6$ and $|B| = 4$. How many one-to-one functions are there from $A$ to $B$? How many onto functions are there from $A$ to $B$?