2: Define $g : W \to W$ where W is the whole numbers $\{0, 1, 2, 3...\}$ by $g(n) = \lfloor \frac{n}{2} \rfloor$. Determine if g is a bijection, surjection only, injection only, or none of these.

Answer:

g is not one-to-one because, for instance, $g(2) = \lfloor \frac{2}{2} \rfloor = \lfloor 1 \rfloor = 1$ and $g(3) = \lfloor \frac{3}{2} \rfloor = \lfloor 1.5 \rfloor = 1$ both map to the same value, 1. That is, $n = 2$ and $n = 3$ are a counterexample to the statement g is one-to-one. Therefore, g is not one-to-one.

Let k be in the codomain. So $k \in W$ and $2k \in W$, $2k$ is in the domain, and $g(2k) = k$. Therefore, g is onto.

Thus, g is a surjection only.

3: Does the function in Problem (2) contradict the statement in Problem (1)? Why or why not?

No, because Problem (1) contains the premise that A is finite. Therefore, the statement does not apply to Problem (2), because the set W is infinite.