Mathematics 554H/701I Homework

Problem 1. These are the problems I assigned in class. Let I be an index set and for each $i \in I$ let A_i be a subset of a universal set S.

(a) Prove

$$\mathcal{C}\left(\bigcap_{i\in I} A_i\right) = \bigcup_{i\in I} \mathcal{C}(A_i)$$

(b) Prove that for any set B that

$$B \cup \left(\bigcap_{i\in I} A_i\right) = \bigcup_{i\in I} (B \cup A_i)$$

□

Let X be a set and let I_X be the identity on X. That is I_X is the function with

$$I_X(x) = x \quad \text{for all } x \in X.$$

(The book writes this as i_X.

Problem 2. Let $f\colon X \to Y$ and $g\colon Y \to X$ be functions and assume

$$g \circ f = I_X.$$

(a) Show f is injective.
(b) Show g is surjective.

Hint: Don't make this hard, your proofs should only be a couple of lines long. □

Problem 3. Do problem 7 on page 12 of the text. □