

An amendment and a remark in Problem 2, MATH2033 in Assignment 2 (20th Feb, 2021)

An amendment

There is a small typo in Problem 2. In the first remark, the statement should be

$$\bigcup_{\alpha \in I} X_{\alpha} = \{x | x \in X_{\alpha} \text{ for some } \alpha \in I\}, \quad \bigcap_{\alpha \in I} X_{\alpha} = \{x | x \in X_{\alpha} \text{ for all } \alpha \in I\}$$

Additional remark (Minor)

In general, the sets $\{X_{\alpha}\}$ and $\{Y_{\alpha}\}$ in (c), (d) can have different index sets and the statement remains to be true (the original statement in the problem is true, don't worry). That is,

$$(c) \quad f\left(\bigcup_{\alpha \in I} X_{\alpha}\right) = \bigcup_{\alpha \in I} f(X_{\alpha}) \quad \text{and} \quad f^{-1}\left(\bigcup_{\alpha \in J} Y_{\alpha}\right) = \bigcup_{\alpha \in J} f^{-1}(Y_{\alpha}).$$

$$(d) \quad f\left(\bigcap_{\alpha \in I} X_{\alpha}\right) \subseteq \bigcap_{\alpha \in I} f(X_{\alpha}) \quad \text{and} \quad f^{-1}\left(\bigcap_{\alpha \in J} Y_{\alpha}\right) = \bigcap_{\alpha \in J} f^{-1}(Y_{\alpha}).$$

I is index set for X_{α} and J is index set for Y_{α} .