MA361 Assignment 3

Suppose A and B are sets and $f : A \to B$ is a function.

Group 1 Write a proof of the following theorem:

Theorem 1. With the information given above, suppose $R, S \subset B$. Then

$$f^{-1}[R \cup S] \;=\; f^{-1}[R] \cup f^{-1}[S]$$

Group 2 Write a proof of the following theorem:

Theorem 2. With the information given above, suppose $R, S \subset B$. Then

$$f^{-1}[R \cap S] \;=\; f^{-1}[R] \cap f^{-1}[S]$$

Group 3 Write a proof of the following theorem:

Theorem 3. With the information given above, suppose $R, S \subset A$. Then

$$f[R \cup S] \;=\; f[R] \cup f[S]$$

Group 4 Write a proof of the following theorem:

Theorem 4. With the information given above, suppose $R, S \subset A$. Then

$$f[R \cap S] \;\subset\; f[R] \cap f[S]$$

Group 5 Write a proof of the following theorem:

Theorem 5. With the information given above, suppose $R \subset A$. Then

$$f^{-1}\left[f[R]\right] \supset R$$

Group 6 Write a proof of the following theorem:

Theorem 6. With the information given above, suppose $S \subset B$. Then

$$f\left[f^{-1}[S]\right] \;\subset S$$