Group 4

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Introduction to Proof and Problem Solving

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Problem 4a.

$$P_1(f) \equiv \{\forall M \in \mathbb{R}, \exists x \in \mathbb{R} \text{ such that } f(x) > M\}$$

$$P_6(f) \equiv \left\{\exists (M, K) \in \mathbb{R}^2, \text{ such that } \forall x > K, f(x) > M\right\}$$

Prove or disprove

$$\{\forall f \text{ satisfying } P_6, f \text{ satisfies } P_1\}.$$

Example 1. It is fairly obvious that P_1 means the function is unbounded from above. To better understand the problem, we'll try to find functions that satisfy P_6.

Let $f_0(x) = 2$. Set $M = 1$ and $K = 1$. Let x be any real number larger than K. We can observe that $f_0(x) = 2 > M$ for all x in this case.

Let $f_1(x) = x$. Set $M = 1$ and $K = 1$. Let x be any real number larger than K. Then we get

While working on this proof, we received no external assistance aside from advice from Professor Mehmetaj.