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Homework 20
Mathematics 2216.01
Due November 2, 2022

1. Suppose that $f : X \rightarrow Y$ is a function, and $V \subseteq Y$.
 - (a) Show that $f(f^{-1}(V)) \subseteq V$.
 - (b) Find an explicit example of a function $f : X \rightarrow Y$ and a subset $V \subseteq Y$ so that $V \neq f(f^{-1}(V))$.
 - (c) Show that if f is a surjection, then $V = f(f^{-1}(V))$.
 - (d) Show that if f is not a surjection, you can always find a particular subset $V \subseteq Y$ so that $V \neq f(f^{-1}(V))$.

2. Suppose that $f : A \rightarrow A$ is defined by $f(x) = x^2$, where A is a nonempty subset of the complex numbers. Find a particular set $A \subseteq \mathbf{C}$ so that f is surjective but not injective.