18. Let \( f : \{0,1\}^n \rightarrow \{0,1\}^n \) be a function and \( k > 0 \) be an integer. Define the function \( f^{(k)} : \{0,1\}^n \rightarrow \{0,1\}^n \) as follows:

\[
f^{(k)} = f \circ f \circ \cdots \circ f,
\]

where “\( \circ \)” denotes function composition. Prove that, if \( f \) is a one-way permutation, so if \( f^{(k)} \). [2 points]

19. Assuming one-way functions exist, prove that the above result does not generalize to one-way functions. [2 points]

Note: These problems are from [Arora-Barak], Chapter 10.