
MATH 2800–80 - Fall 2025 - Assignment 07 - Due 11/25/2025 at 11:59PM

Instructions: Please follow the rules stated in the syllabus. Submit only one pdf file to WyoCourses. Start every problem below on a new page and use the following format.

Result. Write the statement you want to proof.

Proof. Compose the proof. At its completion, end it with the box (see the image at the right end corner).

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1. A function $f : \mathbb{Z} \rightarrow \mathbb{Z}$ is defined by $f(n) = 5n + 2$. Determine whether f is (a) injective, (b) surjective.
 2. Prove that the function $f : \mathbb{R} - \{2\} \rightarrow \mathbb{R} - \{5\}$ defined by $f(x) = \frac{5x + 1}{x - 2}$ is bijective.
 3. Let A be a nonempty set and let $f : A \rightarrow A$ be a function. Prove that if $f \circ f = i_A$, then f is bijective.
 4. The composition $g \circ f : (0, 1) \rightarrow \mathbb{R}$ of two functions f and g is given by $(g \circ f)(x) = \frac{4x - 1}{2\sqrt{x - x^2}}$ where $f : (0, 1) \rightarrow (-1, 1)$ is defined by $f(x) = 2x - 1$ for $x \in (0, 1)$. Determine the function g .
 5. Let $A = \mathbb{R} - \{1\}$ and define $f : A \rightarrow A$ by $f(x) = \frac{x}{x - 1}$ for all $x \in A$. (a) Prove that f is bijective. (b) Determine f^{-1} , i.e., the inverse function of f .
 6. Prove that $\left\{ \frac{n + 2}{2n + 3} \right\}$ is convergent to $\frac{1}{2}$.
 7. Give an $\epsilon - \delta$ proof that $\lim_{x \rightarrow 3} \frac{3x + 1}{4x + 3} = \frac{2}{3}$.