

Instructions: This is a list of some material that is essential prerequisite for this course. That is, your instructor expects that you have a definite idea of the notions expounded below and that you be able to solve the problems below without any review. If you find yourself having trouble on some items below you should seek immediate help from your instructor or from the tutors in the Learning Laboratory.

Essential prerequisites include:

- (a) More than mathematical prerequisites, this course requires the elusive notion of *mathematical maturity*. There will be fairly intricate and long arguments given in this course, and patience and concentration to follow them are essential.
 - (b) You should know how to compute compose two functions given their formulæ.
 - (c) You should know that a function is invertible if and only if it is a bijection.
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You should be able to quickly answer all questions below without needing any review.

1. Let $f(x) = x^2 - 1$ and $g(x) = 2x + 1$. Solve the equation $(f \circ g)(x) = (g \circ f)(x)$.
2. Let $f : \mathbb{R} \setminus \{0\} \rightarrow \mathbb{R} \setminus \{0\}$, $f(x) = \frac{1}{x}$. Prove that f is invertible and find its inverse.
3. List all functions from the set $\{1, 2\}$ to the set $\{a, b\}$.