Imperial College London

Mathematics Pre-arrival course

Test Your Understanding Quiz 1 – Language of Mathematics and Real Functions

We find that sometimes the typesetting for mathematics on blackboard does not work very well. The first thing to try is to change/update browser, as that sometimes solves the issue completely!

1. Which of the following statements are equivalent to the function $f : \mathbb{R} \to \mathbb{R}$ being injective.

   (a) $\exists x, y \in \mathbb{R}(x = y \Rightarrow f(x) = f(y))$

   (b) $\forall x, y \in \mathbb{R}(x \neq y \Rightarrow f(x) \neq f(y))$

   (c) $\forall x, y \in \mathbb{R}(x = y \Rightarrow f(x) = f(y))$

   (d) $\forall x \in \mathbb{R} \; \exists y \in \mathbb{R}(x = f(y))$

   (e) $\forall x \in \mathbb{R} \; \exists y \in \mathbb{R}(f(x) = y)$

2. Which of the following statements are equivalent to the function $f : \mathbb{R} \to \mathbb{R}$ being surjective.

   (a) $\exists x, y \in \mathbb{R}(x = y \Rightarrow f(x) = f(y))$

   (b) $\forall x, y \in \mathbb{R}(x \neq y \Rightarrow f(x) \neq f(y))$

   (c) $\forall x, y \in \mathbb{R}(x = y \Rightarrow f(x) = f(y))$

   (d) $\forall x \in \mathbb{R} \; \exists y \in \mathbb{R}(x = f(y))$

   (e) $\forall x \in \mathbb{R} \; \exists y \in \mathbb{R}(f(x) = y)$