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8. Complete the following assignment prior to Meeting #5:

A. Study our notes from Meeting #4 and comprehend Jim's sample responses to the Quiz #4 prompts that are posted on *Canvas*.

B*. Examine each one of the following propositions to determine whether or not its true; indicate your choice by circling either "T" or "F" then prove that the choice is correct (Please post your responses on the indicated Canvas Assignment link (as a PDF file.)):

i. $f: \mathbf{R} \to \mathbf{R} \ni f(x) = x^2 - 1 \xrightarrow{1:1} f: \mathbf{R} \to \mathbf{R}$

T **(F)**

$f: \mathbf{R} \to \mathbf{R} \ni f(x) = x^2 - 1$ is not a one to one mapping of $\mathbf{R} \to \mathbf{R}$.
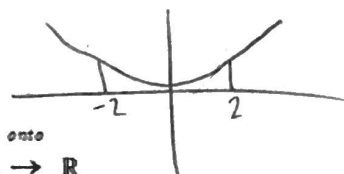
both -2 and 2 map to the same value of 3.

ii. $f: \mathbf{R} \to \mathbf{R} \ni f(x) = x^2 - 1 \xrightarrow{\text{onto}} f: \mathbf{R} \to \mathbf{R}$

T **(F)**

Consider $f(x) = -3$

$-3 = x^2 - 1$

$-2 = x^2$

$\sqrt{-2} = x \longrightarrow$ X is either $-\sqrt{2}i$, or $\sqrt{2}i$, those are not in $\mathbf{R}$

iii. $g: \mathbf{R} \to \mathbf{R} \ni g(x) = \sqrt[3]{x} \xrightarrow{1:1} g: \mathbf{R} \to \mathbf{R}$

(T) F

So from the glossary, $\left(g(x_1) = y_1 \wedge g(x_2) = y_1\right) \Rightarrow x_1 = x_2$

$\left(g(x_1) = y_1 \wedge g(x_2) = y_1\right) \Rightarrow \left(\sqrt[3]{x_1} = y_1 \wedge \sqrt[3]{x_2} = y_1\right) \Rightarrow \left(x_1 = y_1^3 \wedge x_2 = y_1^3\right) \Rightarrow \boxed{x_1 = x_2}$

we know that $g: \mathbf{R} \xrightarrow{1:1} \mathbf{R}$

iv. $g: \mathbf{R} \to \mathbf{R} \ni g(x) = \sqrt[3]{x} \xrightarrow{\text{onto}} g: \mathbf{R} \to \mathbf{R}$

(T) F

we need to prove $f: A \to B \ni$ the range of $f = B$

$\exists x \in \mathbf{R} \ni f(x) = y$

$\sqrt[3]{x} = y$

$x = y^3$

$f(y^3) = \sqrt[3]{y^3} = y$ ✓

v. $h : \mathbb{R} \to \mathbb{R} \ni h(x) = \sqrt{x} \quad \to \quad h : \mathbb{R} \overset{1:1}{\to} \mathbb{R}$

T (F)

$-1 \in \mathbb{R}$

$h(-1) = \sqrt{-1} \to \{-\sqrt{1}\,i, \sqrt{1}\,i\} \notin \mathbb{R}.$

$-1 \quad 2 \quad =$

vi. $(s \subseteq (\mathbb{Q} \times \mathbb{Q}) \times \mathbb{Q} \ni s = \{((x, y),\ xy) : x, y \in \mathbb{Q}\}) \to s : \mathbb{Q} \times \mathbb{Q} \overset{1:1}{\to} \mathbb{Q}$

T (F)

$(1, 6) \to 6$

$(2, 3) \to 6$

Therefore, $\mathbb{Q} \times \mathbb{Q} \to \mathbb{Q}$ is not a one to one mapping, and the statement is false.

C. Compare your responses to the six homework prompts from Item #7B to the sample responses and accompanying explanations posted on *Canvas*.

D. Comprehend the entries from Lines #013–015 from our *Glossary* document.