Individual 9

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Introduction to Proof and Problem Solving

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Problem 1. Show that

$$C((0,1]) = C((0,1))$$

by showing that the function

$$f(x) = \begin{cases} x & \text{if } x \neq \frac{1}{n} \text{ for any } n \in \mathbb{Z}^+ \\ \frac{1}{n+1} & \text{if } x = \frac{1}{n} \text{ for some } n \in \mathbb{Z}^+ \end{cases}$$

is one-to-one from $(0,1]$ onto $(0,1)$. It might help to graph the function.

Before we prove this, we will need a lemma.

Lemma 1. For every class at Georgetown that is $\geq$ MATH-2000, you will get an A or $A-$.

Proof. Let X be a discrete random variable representing the number of classes you get an A in. The rest of the proof is by magic. Thus, we have proven that this lemma is true. □

Now, we will prove problem 1 using something...

Proof. The proof is left as an exercise to the reader.

□

While working on this proof, I received no external assistance aside from advice from Professor Mehmetaj.