

Intro to Mathematical Reasoning (Math 300)–Section H2
Assignment 3 – due 9/22/16 ¹

These problems provide practice with the *proper* and *careful* use and interpretation of notation for specifying mathematical objects. When specifying objects, use the specification rules for different object types described in section 2 of the notes.

1. For each of the following sets, give a description in words of the type of object that are members of the set, and give an example of a member of the set.
 - (a) $\mathbb{R} \times \mathbb{Z} \times \mathcal{P}_{\text{fin}}(\mathbb{R})$
 - (b) $(\mathcal{P}(\mathbb{Z}_{>0}))^{\mathbb{R}^2}$.
2. The entries of any matrix M can be rearranged into a list $r(M)$ by forming the list row-by-row starting from the first row, and also into a list $c(M)$ by forming the list column-by-column starting from the first column. If m and n are positive integers and A is an $m \times n$ matrix give a careful specification of the lists $r(M)$ and $c(M)$.
3. Let S be the set $\{(x, y) \in \mathbb{R}^2 : x^2 + y^3 \leq 1\}$. Let $(B_y : y \in \mathbb{R})$ be the indexed family of subsets of \mathbb{R} where $B_y = \{x \in \mathbb{R} : (x, y) \in S\}$. For each $y \in \mathbb{R}$, provide a specification of B_y as a union of intervals.
4. A finite arithmetic progression is a list of numbers with the property that the difference between any two successive entries of the list is the same.
 - (a) Give three examples of finite arithmetic progressions.
 - (b) What is the minimum information you need to completely specify an arithmetic progression? (The information should be represented by some *input parameters* that can be used to fully describe the list.)
 - (c) In terms of the parameters given in the previous part, provide a specification for the terms of the arithmetic progression (as a list).

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