

MATH1025 Homework 1 Feedback

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Question 1. Overall well done, but many people should read comment 1 below.

1. You need to explain how you got these answers. Imagine you are explaining to a 5-year old child that keeps asking you ‘but why?’. I should be able to follow, step-by-step, how you got from one set to the other. Also, you should be using full sentences in English (with a subject, object, verb, etc).
2. Be careful to distinguish between a set with one element, which itself is a set, vs a set with several elements. For example, $\{\{0, 1\}\}$ is a set with one element, and this element is $\{0, 1\}$, while $\{0, 1\}$ is a set with two elements, 0 and 1.
3. Be careful in distinguishing between \leq and $<$. So, for example, $x < 3$ means all x which are less than 3 (so $x = 3$ does not satisfy this inequality). Similarly, (a, b) is the set of reals x such that $a < x < b$, while $[a, b]$ is the set of reals x such that $a \leq x \leq b$.

Question 2. The most common errors were forgetting where your elements lie, for example writing ‘ $\{x \in \mathbb{R} : 3 \leq x \leq 9\}$ ’ when in fact you wanted just the integers between 3 and 9, inclusive. Another interesting error was making part (ii) way more complicated than it needs to be. Don’t worry - with practice, you’ll learn how to write more elegant and easily-readable sets.

1. Answers such as ‘ $\{x \in \mathbb{Q} : 3^n\}$ ’ are not correct. You have to give a formula (or some other sort of mathematical ‘description’) for x , and this formula cannot depend on x itself. Hence, you might, for example, want to say something like $\{x \in \mathbb{Q} : x = 3^n \text{ for } n \in \mathbb{Z}\}$. Notice how you describe x via a formula which takes an integer $n \in \mathbb{Z}$ and gives an element in your set, $x \in \{\dots, \frac{1}{3}, 1, 3, 9, \dots\}$. Similar comments hold for parts (i) and (ii).
2. When writing sets, distinguish between writing $\{0, 1, 2\}$, which would denote the set with three elements 0, 1, 2, and writing $\{0, 1, 2, \dots\}$, which would denote the set of non-negative integers, i.e. a set with quite a few more elements! Don’t forget the ‘...’!

Question 3. This seemed to be the most problematic question in this homework, partly because I have the feeling that some (very few) people randomly guessed this question. Please keep in mind this is unacceptable, and would contribute towards a ‘0’ on an assignment. Points 1 and 2 below were very prevalent comments (more than 70% of written assignments could benefit from applying at least one of them), so they’re worth reading through.

1. You showed one inclusion. Does the other one hold? For example, it is not enough to say $A \subseteq B$, but you also need to determine whether $B \subseteq A$, and respectively, whether $A = B$.
2. You need to justify your work at least a little. It is not enough to just write ‘ $A \subseteq B$ ’, but you need to explain *why* every element of A is also in B . For examples of how to do this, see the solutions provided by your lecturers.
3. Note that if $A = B$ then you *must have* both $A \subseteq B$ and $B \subseteq A$.

Question 4. Overall well done, I've written individual comments, as there were many different ways of writing out the proof. A few people drew diagrams instead of proofs (you still need to write a proof), and a few were getting a bit confused and giving a counterexample for one direction. However, the majority did a good job of writing out a proof of the (correct) statement!

Question 5. This is one you are supposed to check yourselves (or at least, Kevin said so).