

Sets, Venn Diagrams, and Arguments: Problems

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1. Write down an infinite set and a finite set using both the list notation and also the description notation.
2. Write down two sets which overlap by only a finite-amount of objects. Write down two sets which overlap by an infinite-amount of objects. Write down two sets which don't overlap at all.
3. Let S be the set

$$S = \{\dots, -6, -4, -2, 0, 2, 4, 6, \dots\}.$$

If you add two members of S , will the result be in S everytime, sometimes, or never? What if you subtract them? What if you multiply them? What if you divide them? Give examples to back up your answers.

4. Draw a Venn diagram showing the relationship between the sets $\mathbb{N}, \mathbb{Z}, \mathbb{Q}, \mathbb{R}$.
5. Of the 70 students in the Pre-Law club, 28 are taking a philosophy class, 25 are taking a sociology class, and 30 are taking a history class. Moreover, 9 students are taking sociology only, 11 students are taking philosophy and history class only, 8 students are taking history and sociology only, and 7 are taking philosophy and sociology only.

Draw a Venn diagram to illustrate this information. Use the symbols P, S, H to represent the set of students taking philosophy, sociology, and history, respectively. How many students are taking all three subjects? How many are not taking any of these three?

6. Go on YouTube and watch *The Bear that Wasn't*. Give an example of an inductive and a deductive argument from the cartoon. For your inductive argument, state how strong the argument is and an explanation (one sentence is enough). For your deductive argument, state if it is valid, sound, or neither.

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7. Give your own example of a deductive argument which is valid, and one which is sound, and one which is neither.
8. In class I proved that there are infinitely-many prime numbers. Use the idea in the proof to show that the numbers 2, 3, 5 are not the only primes.