Venn Puzzler: math version

Complete 10 Euler diagrams (on the Venn Puzzler pdf). For each Euler diagram:

1. Come up with 3 properties or definitions of sets so that the Euler diagram is correct.

2. Give an example (or several) of an element belonging to each non-empty region of your Euler diagram. (Don't forget the "outside" region!) You don't need to give an example if the region is supposed to be empty.

Notes:

1. Each property or definition must be mathematical and precise.

2. All elements must be natural numbers (i.e. $1, 2, 3, \ldots$).

3. The more succinct and elegant your properties or definitions, the more points you earn.

Bonus: you can try experimenting with finding examples of other Euler diagrams with 3 sets, as well as the 3 properties/definitions and examples in each region.