1 Category of Vector Spaces

- **Objects**

  Each vector space is an object

- **Morphisms**

  Transformations (represented as matrices) between vector spaces

- **Identities**

  The identity matrix for each vector space

- **Composition**

  Matrix multiplication

2 Monoid of Integers on Addition

This is a singleton category - it contains only one object

- **Objects**

  Integer

  Note the abstraction here. We are not specifying which integer. So, for example both 20 and 25 are things which happen to be represented by the same object *Integer* in this category.

- **Morphisms**

  Set of integers, Z

  This is interesting. Here, the morphisms are just simple integers. So, for example to go from an object, say 20 to an object, say 25 (both are same objects because of our abstraction), we apply the morphism 5. In case of a monoid category, we always start and end at the same object since there is only one object.

- **Identities**

  The integer 0 for our only object *Integer*

- **Composition**

  Integer addition

  That is, to compose say two morphisms 4 and 6, we add them to get a third morphism 10