Incidence relations:

1. Special properties: (Figures of shapes)

The idea of figure arises when, in investigating some category C, we find a small class $\bar{A}$ of objects in C which we use to probe the more complicated object X by means of maps $A \xrightarrow{x} X$ [$A \in \bar{A}$] & x is called figure of shape in A, in X

Terminal object is a basic figure of shape, called 1 "point of an object"

If A is collapsed into X, meaning some features of A are not visible in X, then x is called singular figure.

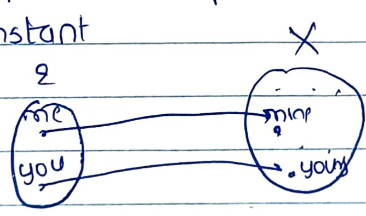
[~~A two points map~~ $2 \xrightarrow{x} X$ ~~is called singular, if x is constant.~~]

I) For category of sets:

Sets, due to lack of structure in objects, have a special property that "if two maps agree on points, they are same map"

It can be viewed as a saying that a very small class of shapes of figures "(just figure of shape 1) suffices to test for equality maps.

[A two points map $2 \xrightarrow{x} X$ is called singular, if x is constant



2 point map is basicly 2 points of an object

II) For category of endomaps

Given any pair of maps $X^{\circlearrowright\alpha} \underset{g}{\overset{f}{\rightrightarrows}} Y^{\circlearrowright\beta}$ in $S^{\circlearrowright}$, if for all figures $N^{\circlearrowright\sigma} \xrightarrow{x} X^{\circlearrowright\alpha}$ of shape $N^{\circlearrowright\sigma}$ it is true that $f \circ x = g \circ x$, then $f = g$

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Epimorphism:

II) For category of Graphs:

Given any pair of maps $X \xrightarrow{f} Y$, $X \xrightarrow{g} Y$ in $S^{\downarrow\downarrow}$ if $f \circ x = g \circ x$ for all figures $D \xrightarrow{x} X$ of shape D & for all figures $A \xrightarrow{x} X$ of shape A, then $f = g$

where $D = \boxed{\bullet}$, $A = \boxed{\bullet \longrightarrow \bullet}$

Incidence:

Suppose that we have in X a figure x of shape A and a figure y of shape B.

then we could have a map $u: A \to B$ satisfying $yu = x$, it means x is incident to y

$$\begin{tikzcd} & B \arrow[dr, "y"] & \\ A \arrow[ur, "u"] \arrow[rr, "x"'] & & X \end{tikzcd}$$

or

$$\begin{tikzcd} T \arrow[r, "u_2"] \arrow[d, "u_1"'] & B \arrow[d, "y"] \\ A \arrow[r, "x"'] & X \end{tikzcd}$$

$xu_1 = yu_2$

$T \to X$ together with incidences in the first sense to each of x & y