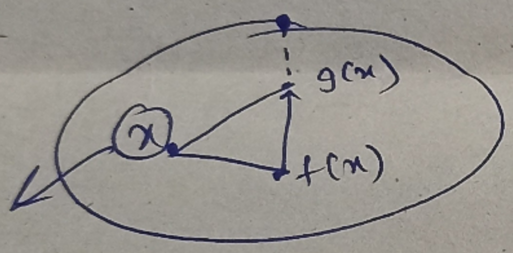
- let $j : C \hookrightarrow D$ be inclusion map.
- $f(x)$ & $g(x)$ are two continuous endomap s.t $f(x) \neq g(x)$ $\forall x \in D$.
- $g \circ j = j$

(This has to be given because, in the geometrical proof for Brouwer's theorem ~~...~~ $x = x$, ~~but~~ even for boundary points

here we need $g(x) = x$ at boundary
$\downarrow$
so $g \circ j = j$)

•



None of our concern

for some x we'll have $f(x)$ & $g(x)$

Now let us mark an arrow from $f(x)$ to $g(x)$, (as to get an unique projection of $g(x)$ on the boundary)

we'll call this map some r

So it will be $r(g(x))$ as it is only for the codomain of g.

Now come to boundary point

for some $x \xrightarrow{g} g(x)$ will be on boundary point & for that $r(g(x))$

$r \circ g = 1_C$

~~multiply~~ compose j on the right side

$r \circ g \circ j = 1_C \circ j$.

$\boxed{r \circ j = j}$ → we can construct a

retracts from ~~$\Leftarrow$~~ $D \to C$

→ so, we proved the contrapositive thing

→ as we know that no such

continuous retract exist for

on inclusion $j : C \to D$

~~we con~~

(from Brouwer's theorem) we

conclude that

$f(x) = g(x)$ for

some x

To prove:

→ $f' \circ x' = x'$ exists

for $x' : T \to A$ & $f' : A \to A$

→ ~~To prove: for~~ Given:

$f \circ x = x$ exists &

$x : T \to X$ & $f : X \to X$

& $A \underset{r}{\overset{s}{\rightleftarrows}} X$ $\quad r \circ s = 1_A$

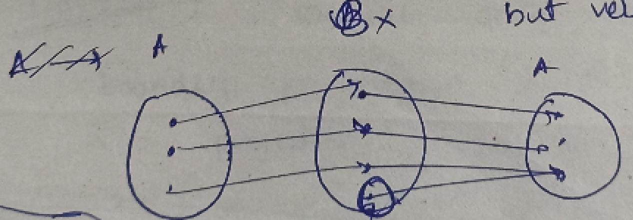
→ Proof: first prove that f' exist & then

$\underline{f' \circ x' = x'}$

→ Because there exist retract for $s : A \to X$ we can write f in terms of f'

(i.e. object X can be used instead of A)

$A \xrightarrow{s} X \xrightarrow{r} A$ $\quad$ ($r \circ s = 1_A$ is also an endomap but very specific one)



hence A cannot be used instead of X what about

$n(A) \leq n(B)$ → for the retract to exist

so;

let $f' : A \to A$

$$X \xrightarrow{r} A \xrightarrow{f'} A \xrightarrow{s} X$$

$\cancel{r \circ f' \circ s = f}$. $\quad s \circ f' \circ r = f$.

$\boxed{f \circ x = x}$ → given

So, $\cancel{r \circ f' \circ s \circ x = f \circ x}$. $\quad s \circ f' \circ r \circ x = \underbrace{f \circ x}_{x}$.

$\overbrace{r \circ s}^{1_{idA}} \circ f' \circ r \circ x = r \circ x$

$f' \circ \underbrace{(r \circ x)}_{x'} = (r \circ x)$

$f' \circ x' = x'$

$\boxed{x' = r \circ x}$

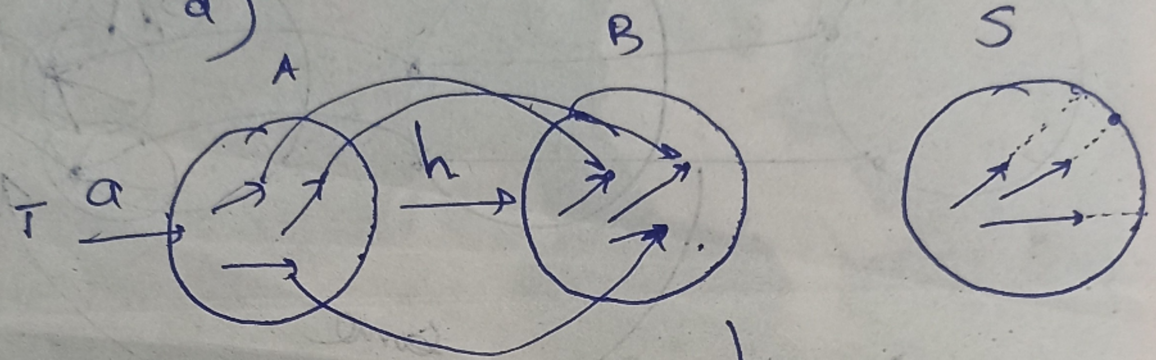
→ $j: S \to B$

S & B are objects in $\mathcal{C}$.

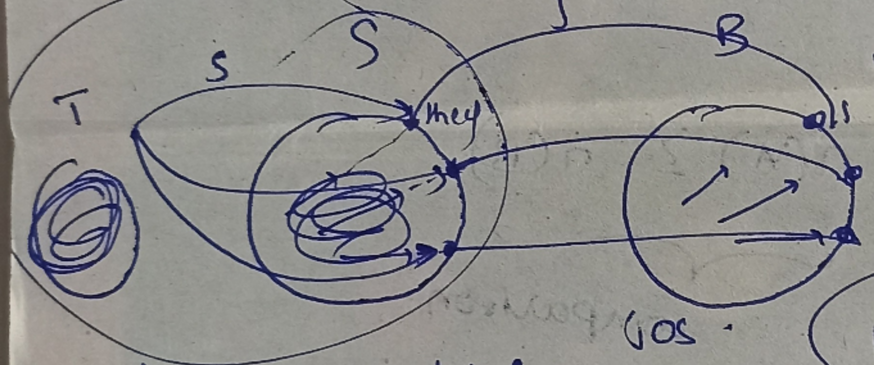
let A also be an object in $\mathcal{C}$

T is "listing" map (An ~~objecting~~ object to make "parametrizing" map

a)



hoa, j

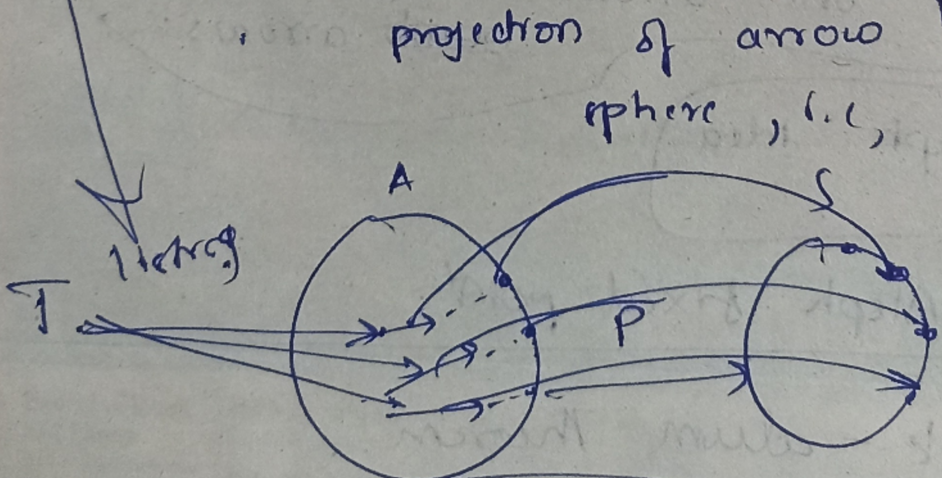


If these two are equal.

jos.

$h \circ s = j \circ 1_S$

Intuitively: we are only ~~considering~~ considering boundry arrows of A or projection of arrow heads on sphere, i.e, $p \circ a = s$

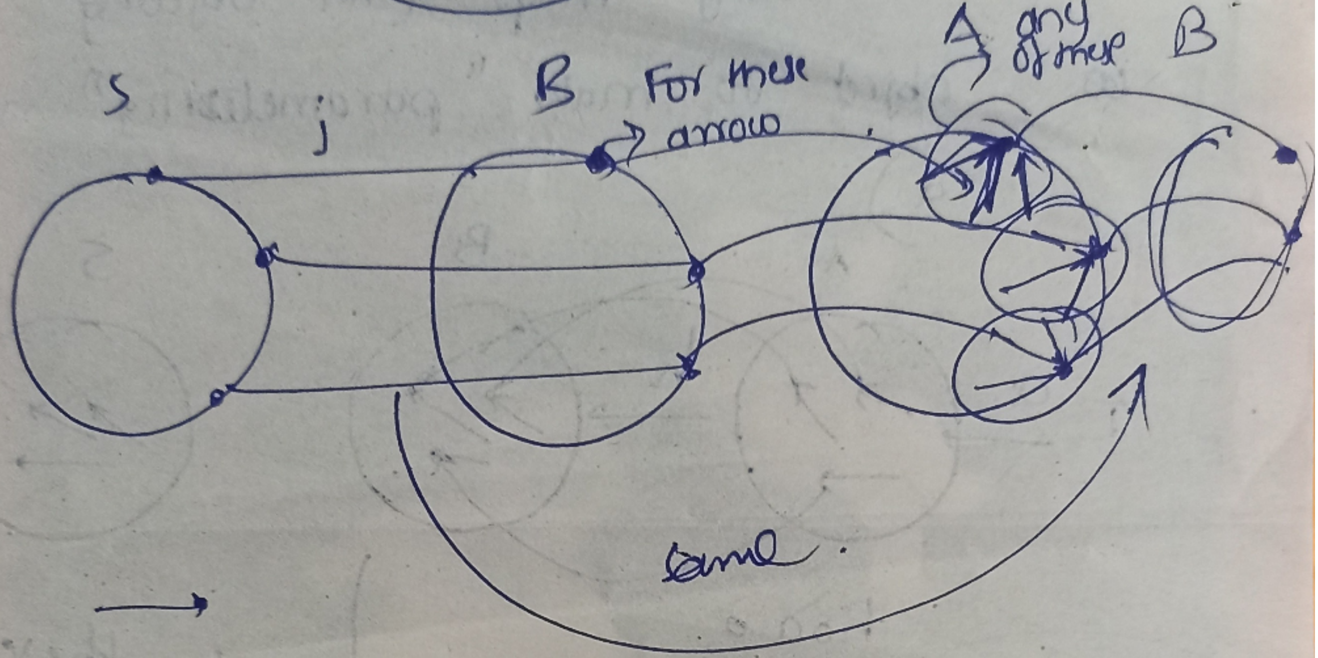


Great illustration for the category theory based on context & not content

$h \circ \alpha \circ j$

A

$$\begin{tikzcd} S \arrow[r, "j"] \arrow[rrr, bend right, "j"'] & B \arrow[r, "\alpha"] & A \arrow[r, "h"] & B \end{tikzcd}$$



Interesting point to note.

$$\underbrace{n(A) \geq n(B)}_{\text{comparison among infinities}}$$

for one arrow head there's infinite ~~numb~~ arrows

$\boxed{\text{Aleph Idea}}$

Aleph fixed point

Borsuk - ulam theorem.