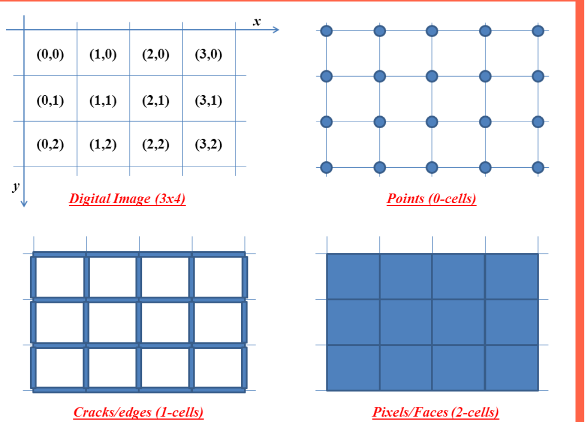
What is...quantum topology - part 9?

Or: Categories 7 from Chapter 1

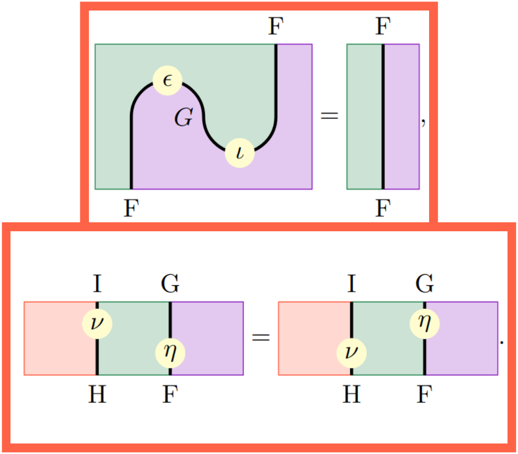
Part 1 of 0-cells, 1-cells, 2-cells, ...



Picture from Wikipedia, page Abstract cell complex

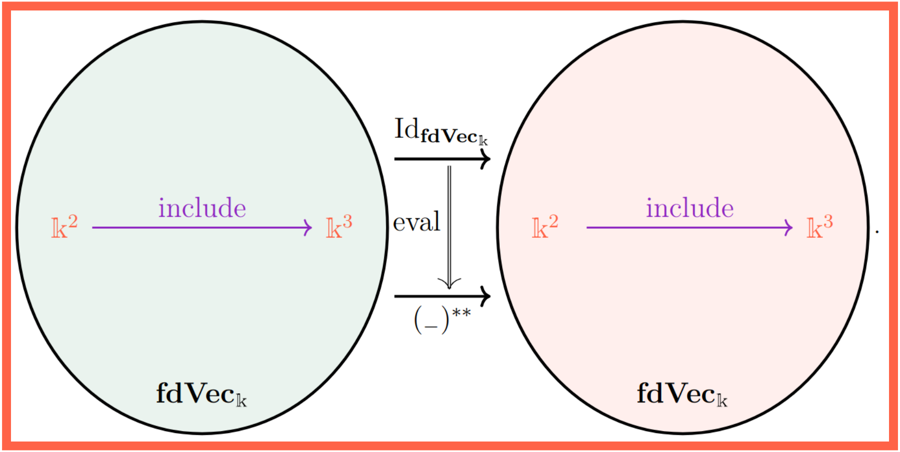
- Recall String diagrams so far give a one dimensional calculus
- Recall We want a two dimensional calculus
- So we need 0-cells, 1-cells, 2-cells

Part 2 of 0-cells, 1-cells, 2-cells, ...



- Let us color faces with categories
- Let us color strings with functors
- Missing: 0-cells Morphisms between functors

The double dual

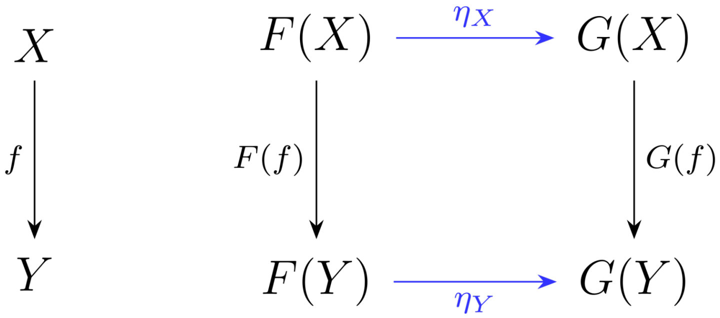


- A vector space and its dual are isomorphic upon a choice of basis
- The double dual is isomorphic without choice of basis, by evaluation
- Evaluation is a morphism between the identity and the double dual

For completeness: A formal definition

A nat trafo $\eta\colon F \Rightarrow G$ is a mapping that:

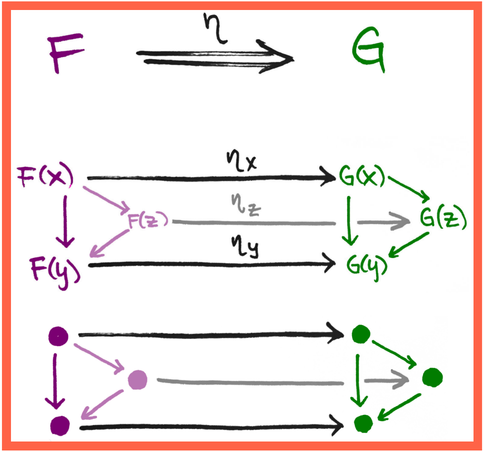
- associates each object X in C to an arrow $\eta_X\colon F(X) \to G(X)$ in D Points↦Lines
- such that $\eta_Y F(f) = G(f)\eta_X$ Nat trafo square



Here $F, G\colon C \to D$ are functors with same source and target categories

The tip of the iceberg: the arrow between nat trafos is called modification

Connecting fancier diagrams



I stole this picture from somewhere, but I forgot from where...

- Functor About commuting diagrams
- Natural transformations (nat trafo) About commuting polytopes

Thank you for your attention!

I hope that was of some help.