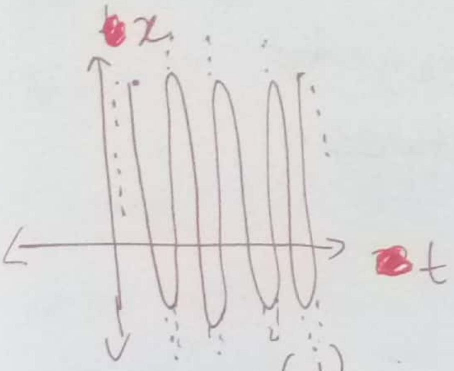
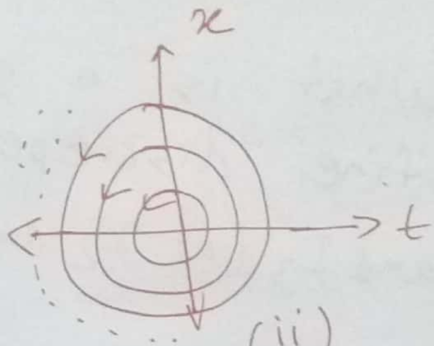
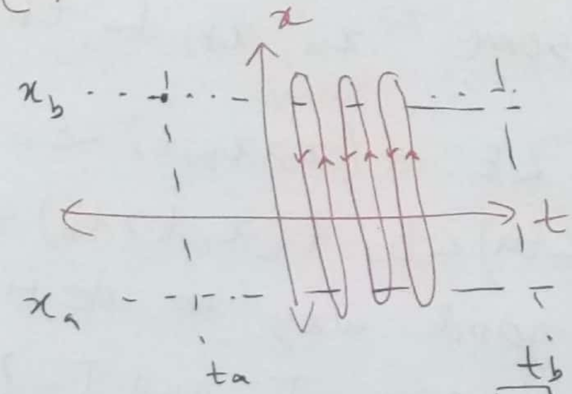
Periodicity and Isomorphism:



(i)



(ii)



(iii)

1) Compute an integral $\boxed{I_1}$ of a function $f(x,t)$ on the contours of concentric circles with center $(0,0)$. , as illustrated in figure (ii)

2) By an isomorphism from contours in figure two, ~~defin~~ compute integral of $f(x,t)$ over contours illustrated in figure (iii), $\boxed{I_2}$. The circles are elongated to ellipses that are preferablly long. (very econtric).

~~3) Compute~~

3). Compute ~~on~~ the integral $\boxed{I_3}$, of $f(x,t)$ on contours illustrated in ~~perio~~ figure (i), in which each

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vertical line like section extends from $(t, x=-\infty)$ to $(t, x=\infty)$.

Q1: What is a good way to define discrepency between I_1 and I_3 (or I_2 and I_3)?

Q2: If for some x_a, x_b, t_a, t_b;

$f(x<x_a, t) < \varepsilon$, $f(x>x_b, t) < \varepsilon$,

$f(x, t<t_a) < \varepsilon$, $f(x, t>t_b) < \varepsilon$,

what is a good way to define discrepency between I_1 and I_2? What are good constraints on the ~~homo~~ isomorphism between I_2 and I_3?

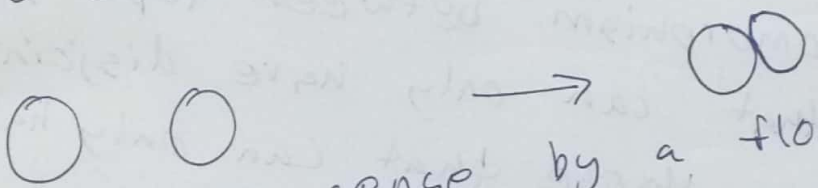
Motivation: Constraints on periodicities.

Q3. What are good distinctions between imposed periodicities that preserve ~~homo~~ isomorphisms and those that don't?

Q4. From sort of the other direction, ~~in order~~ without losing an isomorphism (preserving it) what is the greatest "lift" that you can allow?

Q5. What can be good descriptions for transitions between dissimilar structures that can be used to describe singularities?

Example: (for Q5). I have two closed disjoint sets on a topological space. I want to define an isomorphism to construct another topological space ~~where~~ with ~~there~~ a set that contains only the union of the images of the two closed disjoint sets earlier.



Or in some sense by a flow (not geometric but in similar spirit) in the topological space (a collection of which would be functionals of sort), I want these two closed sets to collide. Because both sets are closed they cannot share a common boundary which sets constraint on what that collission means, or how near can the images be so that the structure is still preserved.

On the other hand, if both sets were open their collission would be regulated as well.

~~What are the~~

What can be a good description between "how close can two closed sets get" and "how close can two open sets get": what is the structure of such boundaries?

If one of the sets was open and the other was closed, one could just have the boundary.

What is a good description of isomorphism between topological spaces that can only have disjoint closed sets, those that can only have disjoint open sets, and those that can have only disjoint open and closed sets? What kinds of periodicities can be imposed or lifted during this variation?

Motivations in physics:

How can we impose, lift or approximate periodicities in space and time?

Given certain periodicities (or topology of contours as in the figures from earlier), or symmetries, perhaps;

what can we describe about what contours actually make sense (what relationship between space and time make sense to accomodate a field.), with insights into singularities.

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Another question one could ask in the same figure is what does it mean to have or not to have:

$$\int \frac{dF}{dx}\, dt = \int \frac{dF}{dt}\, dx$$

on the integration paths.