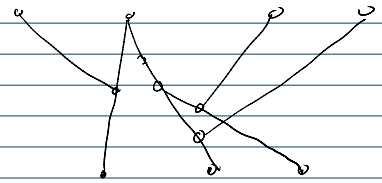
Class 10

Wednesday, 11 March 2015 7:44 AM

Contour tree computation

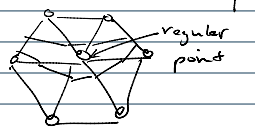
If the domain is simply connected, the reeb graph has no cycles
↓ ↳ contour tree
(Betty numbers 1, 0, 0, ..) for maximum for minimum
use union find to compute merge tree and split tree
then push down / up the hills / valleys from the merge tree / split tree
and build the tree from outside in
eventually both trees will reduce to a single line →

how to embed a contour tree on paper without intersection?



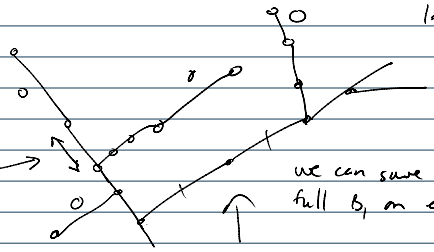
finding Betty 2 from the reeb graph

Euler property:
$\chi = V - E + F = \text{constant}$



Betty number doesn't change between critical points

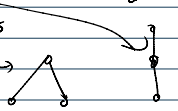
immediately above critical point, $B_2 = 0$
↓
level set = a sphere



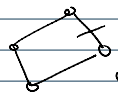
we can save time by only computing full B_1 on each edge

Solve equations at each node on the graph (go inside out)
(~ backwards substitution)

due to going up, if it crosses a 1-saddle $B_1 + = 2$
going down, if it crosses a 2-saddle
or merge graphs



problem:



cycle: do full computation on one edge to break the cycle