#### MAT 531

### Geometry/Topology II

#### Introduction to Smooth Manifolds

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March 31, 2020

Recall that a smooth vector field V

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Infinite-dimensional vector space

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Such a vector field may also be thought of as

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Good generalization for vector fields that are  $C^k$ .

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This makes  $\mathfrak{X}(M)$  into a "Lie algebra."

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is compact.

 $\implies$  every integral curve can be extended to

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This map is called the flow of V.

## Theorem.

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Notice that

 $\Phi_{-t} = (\Phi_t)^{-1}$ 

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General k similar; proceed by induction.