

Differential Topology

6th and 7th Problem Sets
Due Khordad 2nd, 1398

Solve at least 12 problems from the following list.

- Find three one dimensional foliations on $SL(2, \mathbb{R})$, so that the tangent spaces of the foliations at every point span the whole tangent space of $SL(2, \mathbb{R})$.
- Exercise 1.1.4, page 7 from [CC].
- Exercise 1.1.6, page 10 from [CC].
- Exercise 1.1.13, page 16 from [CC].
- Exercise 1.2.7, page 24 from [CC].
- Exercise 1.2.15, page 28 from [CC].
- Exercise 1.3.13, page 38 from [CC].
- Exercise 1.3.16, page 40 from [CC].
- Exercise 2.3.13, page 66 from [CC].
- Exercise 1.4, page 15 from [MM].
- Exercise 1.5, page 17 from [MM].
- Exercise 2.1, page 23 from [MM].
- Exercise 2.29, page 49 from [MM].
- Without using Novikov's Theorem, prove that any codimension one foliation on S^3 can not have a leaf diffeomorphic to S^2 .
- Show that every manifold of Euler characteristic zero does not admit a codimension one foliation.

- Find a non-minimal one dimensional foliation on three dimensional torus ($\mathbb{T}^3 = S^1 \times S^1 \times S^1$) with a dense leaf. (A foliation is called minimal, if every leaf is dense.)
- Exercise 3.2.1, page 56 from [SR].
- Exercises 4.3.2, 4.3.4 and 4.3.5, page 73 from [SR].

REFERENCES

- [CC] Candel, A., Conlon, L., *Foliations I*, Amer. Math. Soc., Providence, RI, 2000.
- [MM] Moerdijk, I., Mrcun, J., *Introduction to Foliations and Lie Groupoids*, Cambridge University Press, 2003.
- [SR] Scardua B., Rojas C. A. M., *Geometry, Dynamics And Topology Of Foliations: A First Course*, 2017.