HOMEWORK 1

1. From [Ush]: 1.2, 1.3*, 2.11, 3.4, 3.14*, 3.15*
2. Let $D : C^\infty(\mathbb{R}) \to C^\infty(\mathbb{R})$ be a derivation. Show that there exists $\phi \in C^\infty(\mathbb{R})$ such that $D(f) = \phi \cdot f'$ where f' denotes the derivative of f.
3. Let C be a constant vector field on $\mathbb{R}^2$ and $Z = -y\frac{\partial}{\partial x} + x\frac{\partial}{\partial y}$. Show that $[C, Z]$ is a constant vector field on $\mathbb{R}^2$ obtained by rotating C by $\frac{\pi}{2}$ in the positive direction.

REFERENCES

[Ush] Mike Usher, *8210 lecture notes*.