

### Petersen Ch. 3 Exercises

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**3. A surjective morphism of sheaves that is not surjective on sections •** Let  $X$  be any manifold such that  $H_{dR}^1(X, \mathbb{R}) \neq 0$ , for instance  $X = S^1$ , let  $\mathcal{F}$  be the sheaf of smooth functions, and let  $\mathcal{G}$  be the group of  $d$ -closed real one-forms on  $X$ . Surjectivity follows from the Poincaré lemma, but the map on global sections is not surjective by the assumption on cohomology.