HOMEWORK #1

Due: January 23, 2026

1. (Hartshorne §II.1) Exercises 2, 3, 5, 6, 7, 8, 10, 12, 15, 16, 18, 22.

2. Verify that the sheaving functor, from $(PreAb_X)$ to (Ab_X), is left-adjoint to the "forgetful" functor including (Ab_X) in $(PreAb_X)$, i.e., the one defined by regarding a sheaf as a presheaf. (This amounts to tracing through the arguments from class.)

   What are some other familiar operations that are left adjoints to forgetful functors? (E.g., the forgetful functors from (Ab) to $(Groups)$ and from $(Groups)$ to $(Sets)$ both have left adjoints: what are they?)