HOMEWORK 5 – MATH 632.

the Hartshornes

1. Hartshorne III.3.1.

2. Hartshorne III.3.2.

3. Hartshorne III.5.4.

4. Hartshorne III.5.7.

5. Hartshorne III.5.8.

6. Hartshorne III.5.10.

7. Hartshorne III.6.1.

8. Hartshorne III.6.2.

9. Let C be a genus 1 curve over a field k. Show that for any point $x \in C$, the group

$$\mathrm{Ext}^1(Oc_C(e), \mathcal{O}_C) \neq 0.$$

Show that the sheaf that arises as this extension is a locally free sheaf of rank 2 that is not split.