

**MATH 256A: PROBLEM SET #10**  
**DUE 11/9/2006**

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For these exercises, you may freely use the results in §6 on curves that have been omitted in class.

*Exercise 1.* Do Hartshorne, Exercise 6.8 of Chapter II.

*Exercise 2.* Do Hartshorne, Exercise 6.9 of Chapter II.

*Exercise 3.* Do Hartshorne, Exercise 6.10 of Chapter II.

*Exercise 4.* Do Hartshorne, Exercise 5.16 of Chapter II.

Under the hypotheses of the previous exercise, suppose that  $\mathcal{F}$  is locally free of rank  $r$ . Then  $\bigwedge^r \mathcal{F}$  is locally free of rank 1, which is to say, invertible. We call this invertible sheaf the **determinant** of  $\mathcal{F}$ , denoted  $\det \mathcal{F}$ . On curves, this generalizes as follows.

*Exercise 5.* Do Hartshorne, Exercise 6.11 of Chapter II.

*Exercise 6.* Do Hartshorne, Exercise 6.12 of Chapter II.

*Exercise 7.* Under the hypotheses of the previous exercise, show that if  $\mathcal{F}$  is locally free, then  $\deg \mathcal{F} = \deg(\det \mathcal{F})$ .