

Math 120c - Spring 2003-2004
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Homework set 5
Due: 12th May 2004

1. Question XX.6 from Lang. (Cohomology, Inflation and Restriction maps).
2. Let G be a finite group, let H be a subgroup of G and let M be a G -module. Prove that, for any non-negative integer n ,

$$\text{Cor} \circ \text{Res} : H^n(G, M) \rightarrow H^n(G, M)$$

acts as multiplication by $[G : H]$.

Hence prove that $H^n(G, M)$ is killed by multiplication by $|G|$.

3. Let $K \subseteq F \subseteq L$ be fields. Show that extension of scalars induces a map

$$\begin{aligned} \text{Res}_K^F : \quad \text{Br}(L/K) &\rightarrow \text{Br}(L/F) \\ \text{Res}_K^F([A]) &\mapsto [F \otimes_K A]. \end{aligned}$$

4. Let A and B be left Artinian algebras over a field K . Prove that $A \otimes_K B$ need not be left Artinian. (Consider A and B such that $\dim_B(A) = \infty$.)
5. Let K be a field of transcendence degree one over an algebraically closed field. Show that $\text{Br}(K)$ is trivial.