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 $n$,

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

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

$$\text{Res}_K^F : \text{Br}(L/K) \to \text{Br}(L/F)$$

$$\text{Res}_K^F([A]) \mapsto [F \otimes_K A].$$

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.