

Math 307 Homework  
October 14, 2015

1. Give an example of matrices with the same trace which are not similar.
2. Give an example of three square matrices  $\mathbf{A}$ ,  $\mathbf{B}$ , and  $\mathbf{C}$  of the same size, such that  $\text{tr } \mathbf{ABC} \neq \text{tr } \mathbf{ACB}$ .
3. For  $\mathbf{A} \in M_n(\mathbb{F})$ , define

$$\text{sum } \mathbf{A} = \sum_{i=1}^n \sum_{j=1}^n a_{ij}.$$

Show that for  $n \geq 2$ , sum is *not* an invariant.