

323 HONORS SPRING 2014, HOMEWORK DUE 4/1

These problems are in addition to the assigned problems from Leon.

- (1) Show that given a linear map $L : V \rightarrow W$, there is a canonical bilinear map $L^b : V \times W^* \rightarrow \mathbb{R}$ associated to L , and given a bilinear map $f : V \times W^* \rightarrow \mathbb{R}$, there is a canonical linear map $L_f : V \rightarrow W$ associated to f . Thus we obtain a third interpretation of $V^* \otimes W$ as the space of bilinear maps $V \times W^* \rightarrow \mathbb{R}$.
- (2) Show that if $\alpha^1, \dots, \alpha^n$ is a basis of V^* and w_1, \dots, w_m is a basis of W , then $\{\alpha^i \otimes w_s \mid 1 \leq i \leq n, 1 \leq s \leq m\}$ is a basis of $V^* \otimes W$.

E-mail address: `jml@math.tamu.edu`