

2022-23 MATH2048: Honours Linear Algebra II

Homework 8

Due: 2022-11-11 (Friday) 23:59

For the following homework questions, please give reasons in your solutions. Scan your solutions and submit it via the Blackboard system before due date.

1. Sec. 5.4 Q19
2. Sec. 5.4 Q24
3. Sec. 5.4 Q28
4. Sec. 5.4 Q30
5. (Tensor Product) Define the trace of a linear operator T as the trace of its matrix representation under any basis, i.e. $tr(T) := tr([T]_{\beta})$.

Let V and W be finite-dimensional spaces. Let $T : V \rightarrow V$ and $U : W \rightarrow W$ be linear. Define a mapping $T \otimes U : V \otimes W \rightarrow V \otimes W$ by $T \otimes U(v \otimes w) = T(v) \otimes U(w)$.

Show that $tr(T \otimes U) = tr(T)tr(U)$.

The following are extra recommended exercises not included in homework.

1. Sec. 5.4 Q26
2. Sec. 5.4 Q29
3. Sec. 5.4 Q32