## Notes - Mathematics

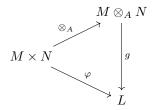
## Nutan Nepal

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## 1 Tensor products, direct and inverse limits

Notes 1.1. Basics of Tensors and Homological Algebra (Matsumura Appendix A)

1.  $\operatorname{Hom}_A(M \otimes_A N, L) \simeq \mathscr{L}(M, N; L)$ . This follows from the definition of tensor products. Here, g is an A-linear map and  $\varphi \in \mathscr{L}(M, N; L)$  (the set of bilinear maps).



- 2.  $(M \otimes_A M') \otimes_A M'' = M \otimes_A M' \otimes_A M'' = M \otimes_A (M' \otimes_A M'')$  (Associativity);  $M \otimes_A N = N \otimes_A M$  (Commutativity);  $M \otimes_A A = M$ ;  $(\bigoplus_{\lambda} M_{\lambda}) \otimes_A N = \bigoplus_{\lambda} (M_{\lambda} \otimes_A N)$  (Distributivity with direct sum).
- 3.  $(f \otimes g)(\sum_i x_i \otimes y_i) = \sum_i f(x_i) \otimes g(y_i)$ .