Exercise 1.2.3

(a) $\boldsymbol{\lambda} \cdot \boldsymbol{\lambda} = \lambda^i \lambda_i = \lambda^i \delta^j_i \lambda_j$

(b) $\boldsymbol{\mu} \cdot \boldsymbol{\lambda} = \mu_i \lambda^i = \mu_i \delta^i_k \lambda^k = \mu_i g^{ij} g_{jk} \lambda^k$

(c) $g_{ij} \lambda^i \mu^j - \lambda^k \mu_k \overset{(1.27)}{=} \lambda_j \mu^j - \lambda^k \mu_k = \boldsymbol{\lambda} \cdot \boldsymbol{\mu} - \boldsymbol{\lambda} \cdot \boldsymbol{\mu} = 0$ ■