(2) Fix some $w \in G$. The map

$$(u, v) \mapsto u \otimes v \otimes w$$

from $E \times F$ to $E \otimes F \otimes G$ is bilinear, and thus there is a linear map $f_w \colon E \otimes F \to E \otimes F \otimes G$ making the following diagram commute

$$\begin{tikzcd} E \times F \arrow[r, "\iota_\otimes"] \arrow[dr] & E \otimes F \arrow[d, "f_w"] \\ & E \otimes F \otimes G, \end{tikzcd}$$

with $f_w(u \otimes v) = u \otimes v \otimes w$.

Next consider the map

$$(z, w) \mapsto f_w(z),$$

from $(E \otimes F) \times G$ into $E \otimes F \otimes G$. It is easily seen to be bilinear, and thus it induces a linear map $f \colon (E \otimes F) \otimes G \to E \otimes F \otimes G$ making the following diagram commute

$$\begin{tikzcd} (E \otimes F) \times G \arrow[r, "\iota_\otimes"] \arrow[dr] & (E \otimes F) \otimes G \arrow[d, "f"] \\ & E \otimes F \otimes G, \end{tikzcd}$$

with $f((u \otimes v) \otimes w) = u \otimes v \otimes w$.

Also consider the map

$$(u, v, w) \mapsto (u \otimes v) \otimes w$$

from $E \times F \times G$ to $(E \otimes F) \otimes G$. It is trilinear, and thus there is a linear map $g \colon E \otimes F \otimes G \to (E \otimes F) \otimes G$ making the following diagram commute

$$\begin{tikzcd} E \times F \times G \arrow[r, "\iota_\otimes"] \arrow[dr] & E \otimes F \otimes G \arrow[d, "g"] \\ & (E \otimes F) \otimes G, \end{tikzcd}$$

with $g(u \otimes v \otimes w) = (u \otimes v) \otimes w$. Clearly, $f \circ g$ and $g \circ f$ are identity maps, and thus f and g are isomorphisms. The other case is similar.

(3) Given a fixed vector space G, for any two vector spaces M and N and every linear map $f \colon M \to N$, let $\tau_G(f) = f \otimes \mathrm{id}_G$ be the unique linear map making the following diagram commute.

$$\begin{tikzcd} M \times G \arrow[r, "\iota_{M\otimes}"] \arrow[d, "f \times \mathrm{id}_G"'] & M \otimes G \arrow[d, "f \otimes \mathrm{id}_G"] \\ N \times G \arrow[r, "\iota_{N\otimes}"'] & N \otimes G \end{tikzcd}$$