Q2i: Let $g \in G$. Suppose that a, b are both multiplicative inverses of g. Using the properties of group multiplication, we get that

$$bg = e \implies (bg)a = ea \implies b(ga) = a \implies b = a$$

Hence the multiplicative identity is unique.

Q2ii: Let $g, h \in G$. We let $(gh)^{-1} = a$. We see that

$$\begin{aligned}
(gh)a &= e \\
g^{-1}(gh)a &= g^{-1}e && \text{(multiply left sides by } g^{-1}\text{)} \\
(g^{-1}g)(ha) &= g^{-1} && \text{(by associativity and identity)} \\
ha &= g^{-1} && \text{(by inverse)} \\
(h^{-1}h)a &= h^{-1}g^{-1} && \text{(multiply left sides by } h^{-1}\text{)} \\
a &= h^{-1}g^{-1} && \text{(by inverse)}
\end{aligned}$$

Thus we see that $a = (gh)^{-1} = h^{-1}g^{-1}$ as desired.

Q2iii: First, note that by multiplying $gh = e$ by h^{-1} to the right, we get that $g = h^{-1}$. Similarly, when we multiply $gh = e$ by g^{-1} to the left we get that $h = g^{-1}$. We can now verify that indeed

$$\begin{aligned}
gh &= e \\
(hg)h &= he && \text{(multiply both sides by } h\text{)} \\
(hg)(hg) &= (he)g && \text{(numtiply both sides by g, associativity)} \\
(g^{-1}g)(h^{-1}h) &= hg \\
ee &= hg && \text{(by inverse)} \\
e &= hg && \text{(by identity)}
\end{aligned}$$

Thus we have that $gh = e = hg$ as desired.