Since f, g are both integrable, define $h = g - f$. By our results from question 1, h is integrable, with $h \geq 0$. Thus for any partition P, both $L(h, P) \geq 0$ and $U(h, P) \geq 0$. Therefore, $0 \leq L(h) = U(h) = \int_A h$. We see that

$$\begin{aligned} & 0 \leq \int_A h \\ \implies & 0 \leq \int_A (g - f) \\ \implies & \int_A f \leq \int_A g \end{aligned}$$

by question 1

As desired.