

$$\begin{aligned}
\text{Q 3.3 } BR_u^k(\hat{a}) &= \{a^k \in A^k \mid u(a^k, \hat{a}^{-k}) \geq u(\tilde{a}^k, \hat{a}^{-k}) \quad \forall \tilde{a}^k \in A^k\} \\
&= \{a^k \in A^k \mid b \cdot u(a^k, \hat{a}^{-k}) \geq b \cdot u(\tilde{a}^k, \hat{a}^{-k}) \quad \forall \tilde{a}^k \in A^k\} \\
&= \{a^k \in A^k \mid c(\hat{a}^{-k}) + b \cdot u(a^k, \hat{a}^{-k}) \geq c(\hat{a}^{-k}) + b \cdot u(\tilde{a}^k, \hat{a}^{-k}) \quad \forall \tilde{a}^k \in A^k\} \\
&= \{a^k \in A^k \mid v(a^k, \hat{a}^{-k}) \geq v(\tilde{a}^k, \hat{a}^{-k}) \quad \forall \tilde{a}^k \in A^k\}
\end{aligned}$$

$$BR_u^k(\hat{a}) = BR_v^k(\hat{a})$$