1. Query Rewriting. Let
\[ T = \{ \text{Player} \equiv \exists \text{plays} . \top, \text{Player} \sqsubseteq \text{Human}, \text{Human} \sqsubseteq \exists \text{has\_father} . \top \} \]
and
\[ F(x) = \text{Human}(x), \quad G(x) = \text{Player}(x) \]
Construct queries \( F_T(x) \) and \( G_T(x) \) such that for all ABoxes \( \mathcal{A} \) and the corresponding interpretations \( \mathcal{I}_\mathcal{A} \) the following holds for all individual names \( a \):
\[
(\mathcal{T}, \mathcal{A}) \models F(a) \iff \mathcal{I}_\mathcal{A} \models F_T(a)
\]
\[
(\mathcal{T}, \mathcal{A}) \models G(a) \iff \mathcal{I}_\mathcal{A} \models G_T(a)
\]

2. Query Rewriting. Let
\[ T = \{ \exists \text{has\_predecessor} . \text{Number} \sqsubseteq \text{Number} \} \]
and let
\[ F(x) = \text{Number}(x) \]
Does there exist an FOPL query \( F_T(x) \) such that for all ABoxes \( \mathcal{A} \) and the corresponding interpretations \( \mathcal{I}_\mathcal{A} \) the following holds for all individual names \( a \):
\[
(\mathcal{T}, \mathcal{A}) \models F(a) \iff \mathcal{I}_\mathcal{A} \models F_T(a)
\]
Give an informal explanation for your answer.

3. Axiom Pinpointing. Let
\[ T = \{ C \sqsubseteq D, A \sqsubseteq E, E \sqsubseteq \exists r.F, F \sqsubseteq B, H \sqsubseteq B, F \sqsubseteq H \} \]
be a TBox. Then we have that \( T \models A \sqsubseteq \exists r.B \). Determine two sets of axioms that are contained in the pinpointing set \( \text{Pin}(T, A \sqsubseteq \exists r.B) \).