Exercise 9: Query answering in DL-Lite

Consider the following DL-Lite TBox $\mathcal{T}$:

$$A \sqsubseteq D \quad \exists s \sqsubseteq \neg A \quad s^- \sqsubseteq r \quad C \sqsubseteq A \quad E \sqsubseteq \exists s^-$$

the ABox $\mathcal{A}$ with the following assertions:

$A(a) \quad s(b, a) \quad C(d) \quad r(d, c) \quad r(f, d) \quad r(c, e) \quad A(g) \quad E(g)$

and the conjunctive query

$$q(x, z) = \exists y \ A(x) \land r(x, y) \land r(z, y)$$

1. Give a query that can be used to test satisfiability w.r.t. $\mathcal{T}$.
   - Use your result to decide whether $(\mathcal{T}, \mathcal{A})$ is satisfiable.

2. Compute a rewriting of $q$ and $\mathcal{T}' = \mathcal{T} \setminus \{\exists s \sqsubseteq \neg A\}$.
   - Use your result to determine the certain answers to $q$ w.r.t. $(\mathcal{T}', \mathcal{A})$. 
