Exercises: Rewriting

Exercise 1

Rewrite the query q(x) with respect to \mathcal{T} to obtain the certain answers of q(x) over $\langle \mathcal{T}, \mathcal{A} \rangle$.

$$\mathcal{T} = \{ B \sqsubseteq A, A \sqsubseteq \exists S, P \sqsubseteq R^{-} \}$$
$$\mathcal{A} = \{ R(a, b), S(c, d), P(c, a), B(b) \}$$
$$q(x) = \exists y R(a, x) \land S(x, y)$$

Exercise 2

Rewrite the query q(x) with respect to Σ to obtain the certain answers of q(x) over $\langle \Sigma, D \rangle$.

$$\begin{split} \Sigma &= \{B(X) \rightarrow R(X,Y) \land P(Y,Z), \\ &P(X,Y) \rightarrow S(X,Y) \land A(Y), \\ &S(X,Y) \rightarrow R(X,Z) \land S(Z,Y)\} \\ D &= \{A(a),B(b),S(c,a)\} \\ q(x) &= \exists yz R(x,y) \land S(y,z) \land A(z) \end{split}$$

Exercise 3

1. Rewrite the query q(x) with respect to Σ to obtain the certain answers of q(x) over $\langle \Sigma, D \rangle$.

$$\begin{split} \Sigma &= \{A(X) \rightarrow R(X,Y) \land B(Y), \\ &R(X,Y) \rightarrow P(Y,X), \\ &B(X) \rightarrow R(X,Y) \land P(Y,Z), \\ &S(X,Y) \rightarrow R(X,Z) \land P(Z,Y), \\ &C(X) \rightarrow R(Y,X) \land P(X,Y)\} \\ &D &= \{A(a),B(b),S(c,d),C(d)\} \end{split}$$

$$q(x) = \exists y R(x, y) \land P(y, x)$$

2. Rewrite the query q(x) with respect to $\Sigma' = \Sigma \setminus \{R(X, Y) \to P(Y, X)\}$ to obtain the certain answers of q(x) over $\langle \Sigma', D \rangle$.