1 Query Containment

1. (0 points)

Proofs are optional, except where otherwise stated.

(a) Indicate all containment or equivalence relationships between the following queries:

\[ Q_1 = R(x, y) \land R(z, y) \land R(x, u) \]
\[ Q_2 = R(x, y) \land R(y, z) \land R(z, u) \]
\[ Q_3 = R(x, y) \land R(y, z) \land R(z, x) \]
\[ Q_4 = R(x, y) \]

(b) Indicate all containment or equivalence relationships between the following queries:

\[ Q_1 = R(x, y) \land R(y, z) \land R(z, x) \]
\[ Q_2 = R(x, y) \land R(y, z) \land R(z, x) \land x \geq y \]
\[ Q_3 = R(x, y) \land R(y, z) \land R(z, x) \land x \leq y \leq z \]

(c) \[ Q_1 \equiv Q_2: \]
\[ Q_1 = R(x_1, x_2) \land R(x_2, x_3) \land R(x_3, x_4) \land R(x_4, x_5) \land R(x_5, x_1) \land x_1 \neq x_2 \]
\[ Q_2 = R(x_1, x_2) \land R(x_2, x_3) \land R(x_3, x_4) \land R(x_4, x_5) \land R(x_5, x_1) \land x_1 \neq x_3 \]

References