Logic and Proof

(a) Exhibit a formula that is logically equivalent to the following BDD, justifying your answer. [3 marks]

(b) Consider the following set of four clauses, where the variables are $x, y$ and $z$:

\[
\begin{align*}
&\{P(x, z), P(y, x), Q(f(z))\} \\
&\{\neg P(x, a), \neg P(a, x), Q(x)\} \\
&\{\neg Q(x)\} \\
&\{\neg Q(b)\}
\end{align*}
\]

(i) What is the Herbrand universe of these clauses? [4 marks]

(ii) Exhibit a Herbrand model satisfying these clauses, or prove that none exists. [13 marks]