**TD: Description logic $\mathcal{EL}$**

**Exercise 8: Reasoning in $\mathcal{EL}$**

Consider an $\mathcal{EL}$ KB whose TBox $\mathcal{T}$ contains the following inclusions:

\[
\begin{align*}
A &\subseteq B & \exists r. \top &\subseteq D & H &\subseteq \exists t.A & D &\subseteq M \\
B &\subseteq \exists r.E & D \cap M &\subseteq H & A &\subseteq \exists s.B & \exists s.M &\subseteq G
\end{align*}
\]

and the ABox $\mathcal{A}$ consists of the following assertions:

\[
D(a) \quad s(a, b) \quad r(b, a)
\]

1. Compute the saturated KB.

2. Construct the associated canonical model.

3. Use your results to decide which of the following are entailed from $(\mathcal{T}, \mathcal{A})$, and explain how you obtained your answers.

\[
D(a) \quad D(b) \quad D(w_A) \quad A \subseteq H \quad H \subseteq A \quad B \subseteq D \quad D \subseteq B
\]