μ^* **for** $X_1 \to X_2 \to X_3$

1. In this information diagram,

$$
\begin{aligned}
I(X_1; X_3 | X_2) &= \mu^*(\tilde{X}_1 \cap \tilde{X}_3 - \tilde{X}_2) \\
&= \mu^*(\emptyset) \\
&= 0.
\end{aligned}
$$

2. Also,

$$
\begin{aligned}
\mu^*(\tilde{X}_1 \cap \tilde{X}_2 \cap \tilde{X}_3) &= \mu^*(\tilde{X}_1 \cap \tilde{X}_3) \\
&= I(X_1; X_3) \\
&\geq 0.
\end{aligned}
$$

3. Since the values of μ^* on all the remaining atoms correspond to Shannon's information measures and hence are nonnegative, we conclude that μ^* is a measure.