Question 1. *Simplify the expression:* $[(A \cup B)' \triangle B] \cup B'$

Solution. We have

$$
\begin{aligned}
[(A \cup B)' \triangle B] \cup B' &= [((A \cup B)' \cap B') \cup ((A \cup B)'' \cap B)] \cup B' \\
&= [(A' \cap B' \cap B') \cup ((A \cup B) \cap B)] \cup B' \\
&= [(A' \cap B') \cup B] \cup B' \\
&= (A' \cap B') \cup (B \cup B') \\
&= (A' \cap B') \cup U \\
&= U,
\end{aligned}
$$

where U denotes the universe which contains A and B.
Answer: the universe U. $\qquad\square$