1. (2 points) Determine whether or not the following is a statement. If it is a statement, say if it is true or false.

If $x$ and $y$ are real numbers and $5x = 5y$, then $x = y$.

Answer: Statement, True

2. (2 points) Express the statement or open sentence in one of the forms $P \land Q$, $P \lor Q$ or $\neg P$. Be sure to also state exactly what statements $P$ and $Q$ stand for.

$x \in A \cup B$.

Answer: $P \lor Q$ where $P : x \in A$ and $Q : x \in B$

3. (2 points) Without changing the meaning, convert the following sentence into a sentence having the form ”If $P$, then $Q$.

For a function to be continuous, it is sufficient that it is differentiable.

Answer: If a function is differentiable, then the function is continuous.

4. (2 points) Write a truth table for the logical statement.

$(Q \lor R) \iff (R \land Q)$

5. (2 points) Decide whether or not the following pair of statements are logically equivalent.

$P \land (Q \lor \neg Q)$ and $(\neg P) \Rightarrow (Q \land \neg Q)$

Answer: The statements are logically equivalent.