Assignment 1
Programming Theory

It is not necessary to show the steps involving application of commutativity and associativity. All other steps must be explicitly shown!

**Assignment 1 (25%)** Prove the theorem

\[(p \Rightarrow r) \land (q \Rightarrow r) \Rightarrow (p \lor q \Rightarrow r)\]

using the axioms and inference rules of section 1 in the compendium

**Assignment 2 (25%)** Prove

\[(p \Rightarrow q) \Rightarrow (p \lor r \Rightarrow q \lor r)\]

using the axioms and inference rules of section 1 in the compendium

**Assignment 3 (50%)** Prove the theorem

\[1 < i < j < k \Rightarrow \left( \exists i : j \leq i < k + 1 : x = B[i] \right) \Rightarrow x \in B[i : k] \]

using the axioms, theorems and inference rules of sections 1, 2, 4 and 8 in the compendium.