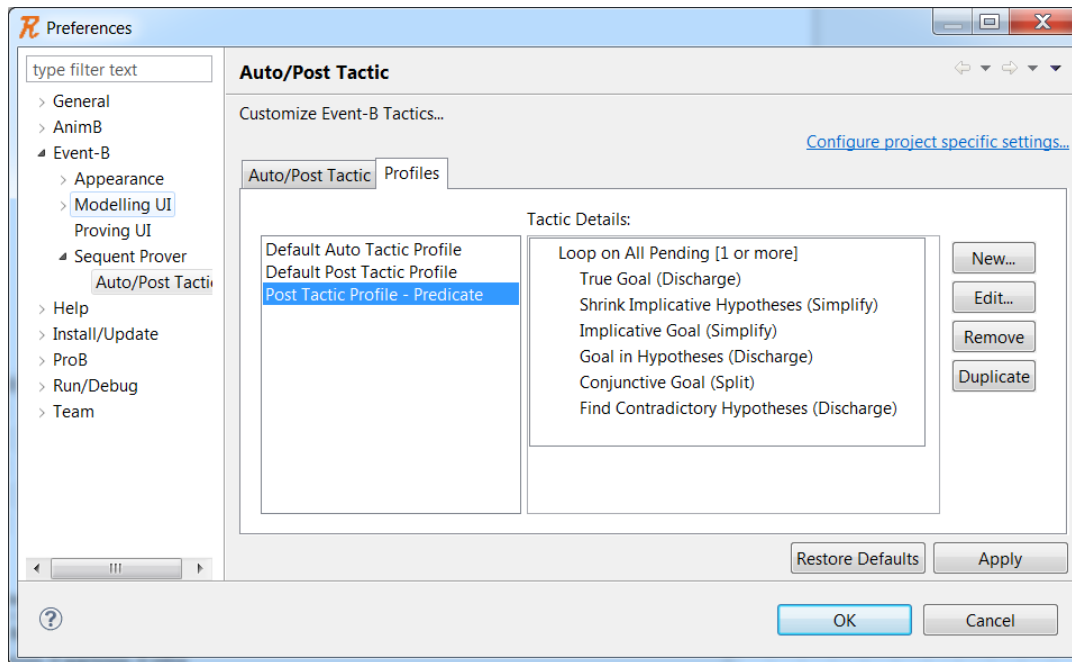


Lab: Predicate Logic

1 Predicate Logic

Read the *Rodin User's Handbook*¹, section 2.5.1 on Mathematical notation *Predicates* and section 25.2 on *Data types*.

Now create a new *Post Tactic Profile* (don't change the default ones). Set your post tactic for doing predicate logic to allow only the propositional rules shown below.



Make sure you understand the above rules.²

- Import *PredicateLogic-Complex.zip*. There are seven contexts *to prove*.
- Switch to the proving perspective. You must prove each of the theorems in each of the contexts.
- For each theorem, prune the proof so that you can now prove the theorem manually (except for the automatic use of the post tactics *True Goal*, *Implicative Goal* etc.).

¹ <http://handbook.event-b.org/current/html/> . It's also on the SVN under *docs*.

² See http://wiki.event-b.org/index.php/Inference_Rules

Some Hints:

- Sometimes you will have to instantiate a universally quantified hypothesis. For this, introduce the instantiating expressions in the corresponding yellow fields and press the implication operator inside the quantification (choose the option "Instantiate universal followed by modus ponens"), or press the universal quantification operator in case there is no implication operator inside the quantified formula.
- Sometimes you will have to instantiate an existentially quantified goal. For this, introduce the instantiating expressions in the corresponding yellow fields and press the existential operator.
- In the proof of "pred3", when you are blocked, prove the lemma $\forall x, y \cdot x \mapsto y \in R \Rightarrow y \mapsto x \in R$. For this enter this formula in the bottom part of the "proof control" and then press button "ah".
- However, don't prove the lemma immediately. Instead, press the blue button R. This has the effect of considering that the lemma is proved. Finish up the proof. At the end the smiley become blue (not green). It means that you still have some work to do, namely to prove the lemma.
- In order to prove the lemma, press the blue hand button on the right of the "Proof Control".
- In order to prove this lemma, you will need another lemma, namely $\forall x \cdot x \mapsto x \in R$. Do the same as before: press the button "ah", but don't prove that second lemma immediately (press the blue R). First prove the first lemma.
- Finally, prove now the second lemma as indicated before (press the blue hand button).