Assignment 5

Submit exactly 3 Isabelle files as follows. Please do not submit them in a zip file or any other archive format.

1)

Follow the instructions in the file Assignment_5.thy and submit the file with the correct proofs.

2)

Use Pure_HOL to prove the formulas listed below, following the style in the files Pure_HOL_Exercises.thy and Pure_HOL_Exercises_Solutions.thy given in DTU Learn.

```
¬ (p ∧ q) ⟷ ¬ p ∨ ¬ q

¬ (p ∨ q) ⟷ ¬ p ∧ ¬ q

(∀x. p x) ⟶ (∃x. p x)

(∀x. ¬ r x ⟶ r (f x)) ⟶ (∃x. r x ∧ r (f (f x)))
```

The last formula is a difficult challenge – a possible formulation in English:

If every person that is not rich has a rich father, then some rich person must have a rich grandfather.

Make sure that the "theory" command imports Pure_HOL and remember the "end" command at the end.

Also make sure that Isabelle processes the whole file without errors.

Do not submit files like Pure_HOL.thy given in DTU Learn.

3)

Solve exercise 4.3, exercise 4.4 and exercise 4.5 in the "Programming and Proving in Isabelle/HOL" tutorial.

Please try to keep each line shorter than 100 characters.

Make sure that the "theory" command imports Main and remember the "end" command at the end.

Also make sure that Isabelle processes the whole file without errors.