

Contracts proof (SPARK)

The purpose of these exercises is to statically prove the absence of runtime errors, contracts and properties of the source code.

Note : Follow the instructions, keep the structure of the folders, do not rename files, use already provided functions and macros, do not rename provided functions and macros

Running gnatprove trough Alire

```
alr gnatprove -P myproject.gpr -j0 --level=0 --output=oneline --report=all
```

Setting up your environment :

```
eval "$(alr printenv)"  
gnatprove -P myproject.gpr -j0 --level=0 --output=oneline --report=all
```

Part 1 - Dynmaic to static analysis (Go to stack folder)

Question 1

Build and prove the stack package.

Part 2 - Proving Loops Correct (Go to loops folder)

This exercise proposes a few simple algorithms involving loops. The aim is to add the necessary loop variants and invariants to prove them correct

Question 1 Find_Int_Sqrt function in isqrt.adb

Add a suitable loop invariant and prove the correctness of the loop.

Question 2 Find_Int_Sqrt function in isqrt.adb

Add a suitable loop variant and prove that the loop terminates.

Question 3 Arrays_Max function in max.adb

Add a suitable loop invariant and prove the correctness of the loop.

Question 4 Arrays_Max function in max.adb

Add a suitable loop variant and prove that the loop terminates.

Question 5 Merge function in max.adb

Add a suitable loop invariant and prove the correctness of the loop.

Question 6 Merge function in max.adb

Do we need a variant? Provide your answer in answers.txt in the loops folder

Part 3 (Go to lcp folder)

Follow the instructions given in questions.pdf in the lcp folder.

Part 4 (Go to challenge) [Bonus]**Question 1**

Prove the absence of runtime errors in Prove_The_Absence_Of_Run_Time_Errors function.

Submission

Once you have done the exercises keeping the folder structure provided create a zip file in place named student_day3.zip containing the same folder structure and files and submit the zip file on Moodle.