IST-OPS Final Exam — December 2025

Name:

- First, write your name in the box above. Then, have a quick read through all 10 questions.
- In the end, you will write up your answers on this paper.
  - But please make a draft elsewhere first. Only hand in something readable. Really.
- This is an open-book open-laptop exam: you may work on scrap paper and/or on your screen.
  - But please refrain from cheating with e.g. ChatGPT, or your grade will be meaningless.
- Each question is independent from others, except stated otherwise.

1 General Unix knowledge

Question 1 For each acronym below, give the full unabbreviated expression.

INSA	Institut National des Sciences Appliquées
ASCII	
ELF	
EOF	
K&R	

Question 2 What is the difference between a relative path and an absolute path ? Explain the nuances and also give examples of both.

Question 3 In this course, we used the GCC compiler a lot, always with a handful of additional command-line options. What are those options ?

2 Kernel and syscalls

Question 4 Implement the function below so that calling `chain(N)` creates *N* new processes in total, all forming a single-branch family tree. In other words, each process involved must have at most one child.

```
void chain(unsigned int N)
{









}
```

Question 5 In the list below, which system call(s) return control to the calling code when successful, and which don't? Please circle "Y" for "this function does return" and circle "N" for "this function does not return".

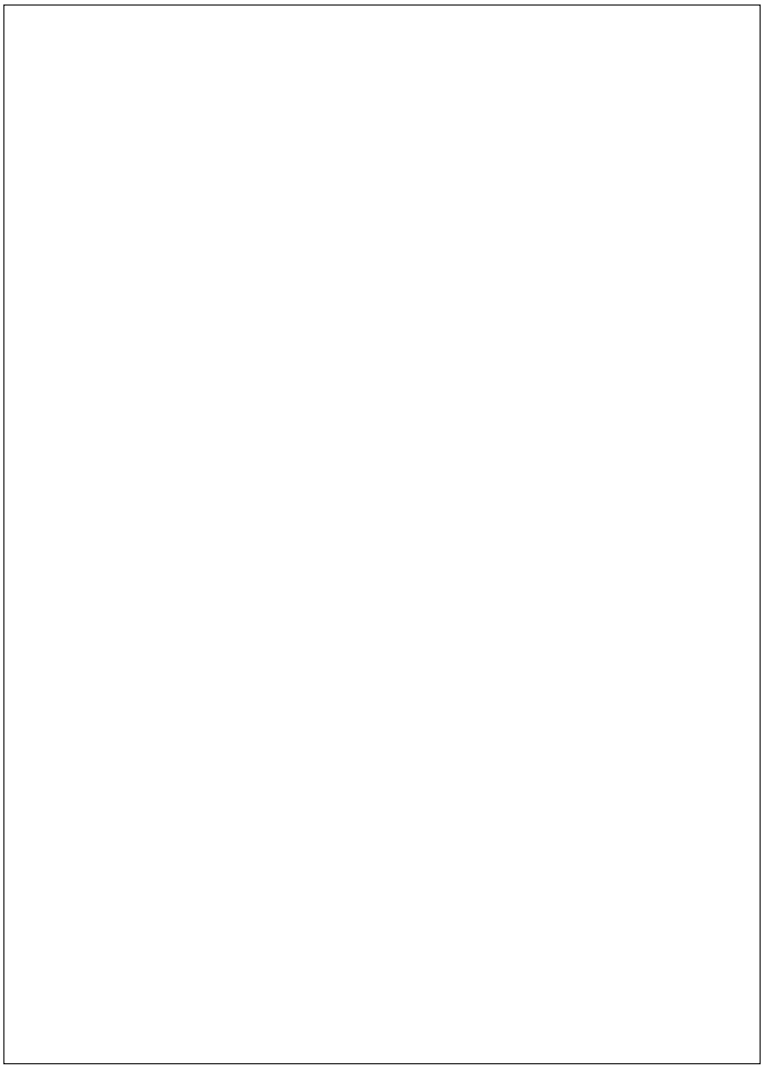
Y N exec
Y N exit
Y N fork
Y N getpid
Y N sleep
Y N wait

3 Using `stdio.h`

Question 6 In the rectangles below, copy the notes you took at exercise 3 of chapter 4, about formatting codes (10 cases in total).

Question 7 Write a program which parses each of its command-line arguments as binary numbers and then prints the corresponding value in decimal, as illustrated below. You should implement the parsing yourself, character by character, as opposed to using a function from the standard library, like `strtoul()`.

```
% ./binparse 0 011 111 101010 10000000000000000
0: 0
011: 3
111: 7
101010: 42
10000000000000000: 65536
```



4 Pointers and memory management

Question 8 What is the standard signature of the `main()` function in a C program ? Give a short explanation about every word in that signature.

Question 9 In the rectangle below, copy your solution to exercise 5 in chapter 5 (finding the maximum value in an array).

5 Structured data types

Question 10 In C, what is the difference between operators “ . ” and “−>” ?