



Fundamentals of C++ Programming Examination

Version 1.0.0

The practical part of the exam consists of two tasks.

The student must choose and complete two tasks from the ones suggested below.

Task 1

Create a Battleship game.

Here you can find the rules:

[https://en.wikipedia.org/wiki/Battleship_\(game\)](https://en.wikipedia.org/wiki/Battleship_(game)).

The main features of the game implementation:

- Game modes:
 - Human vs. computer;
 - Computer vs. computer.
- Ship arrangement:
 - The player arranges ships manually;
 - The computer arranges them instead of the player.
- The computer can play in two modes:
 - Random shot;
 - Intellectual game. The computer builds the strategy of the game instead of shooting randomly.
- Display the current fields of the player and computer;
- The possibility to stop, pause, and restart the game.

Task 2

Create a game 15 Puzzle.

Here you can find more information about the game:

https://en.wikipedia.org/wiki/15_puzzle.

The main features of the game implementation:

- Choice of the field size:
 - 8 (3×3);
 - 15 (4×4).
- Game modes:
 - Solved by human;
 - Solved by computer.
- Initial shuffling:
 - Manual shuffling;
 - Computer-made shuffling.
- Statistics:
 - Amount of time spent on solving the puzzle;
 - Number of moves.

Task 3

Create a To-Do List application.

The application must allow to:

- Add tasks. Tasks have:
 - Name;
 - Priority;
 - Description;
 - Date, time of completion.
- Delete tasks;
- Edit tasks;
- Search tasks by:
 - Name;
 - Priority;
 - Description;
 - Date and time of completion.
- Display the to-do list:
 - For a day;
 - For a week;
 - For a month.

- When displaying, it must be sortable:
 - By priority;
 - By date and time of completion.

Task 4

Create a Memory Card game.

Here you can find the rules:

<https://www.memozor.com/memory-games/memory-game-rules>.

The main features of the game implementation:

- The choice of the filed size;
- The initial arrangement of cards is done by a computer;
- In-game sounds:
 - If the cards match, there is one sound;
 - If the cards do not match, there is another sound.
- Statistics:
 - Play time;
 - Number of card flips.

Task 5

Create an app to calculate the user's arithmetic expression.

The user enters an arithmetic expression from a keyboard.

The expression can contain: (), +, -, *, /.

The app calculates it taking into account parentheses and priorities.

The result is displayed on the screen.

Let's say the user enters this one:

$5 * 2 + 1$

Result: 11

If the user enters this:

$5 * (2 + 1)$

Result: 15

Task 6

Create an app Lyrics Catalog.

The application must have the following features:

- Add lyrics:
 - The lyrics can be:
 - entered from the keyboard;
 - uploaded from a file.
 - Each lyrics must have the name, author, and the year the song was written (if known).
- Delete lyrics;
- Edit lyrics;
- Display lyrics on the screen;
- Save lyrics to a file;
- Search and display all lyrics of an author;
- Search and display all lyrics containing the word specified by the user.