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**Team #1:**

**A platform for Interactive and Collaborative Mathematics Olympiad Training.**

**English VII  
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**Introduction**

Mathematics Olympiads are competitions that foster advanced problem-solving skills, and critical thinking. Success in these contests requires to have a lot of preparation in a structured way, solving a lot of different problems, mastering different topics and doing mock exams. The development of a digital platform that facilitates these activities is highly relevant, as it provides structured and personalized training, and a community where students can ask questions.

**Problem Statement**

Students preparing for Mathematical Olympiads face several challenges, for example: absence of study resources in Spanish as problems or theory, little knowledge of their weakness and how to strengthen them, limited communication with people that can help, and no mock exams.

**Objectives:**

Develop a software platform available both on the web and as a mobile application. Its main goal is to improve how students prepare for Mathematics Olympiad competitions.

The idea is to build a community space where every student can:

* Search and filter problems according to different criteria.
* Save problems into personal lists.
* Discuss solutions with other users.
* Take mock exams directly on the platform.

The mobile version includes all the same functions as the web version but also allows students to save certain problems for offline use.

**Description**  
At the core of the platform is a repository that stores all math problems in a database. Each problem contains key information such as its statement, origin, and subject area. Students can interact with problems in different ways: they can mark them as solved, add or edit tags, and vote on both difficulty (on a scale from 0 to 9) and quality (on a scale from 1 to 5). These ratings are averaged and displayed so that future users can immediately see how challenging or valuable a problem might be.

Besides problems, there is also a **theory section** where users can upload articles, theorems, or techniques. These theory posts can link directly to problems available on the platform. Every problem and article has its own comment section, and comments can be marked as solutions when they provide a correct answer.

Problems can be filtered not only by tags but also by their average ratings of quality and difficulty. In addition, the platform aims to include **semantic search**. This means that instead of searching only for exact words, the system can understand the meaning of what a user types. For example, if a student searches for “problems with integrals,” the system could also find problems described as “area under the curve.” This smarter search is possible using modern embedding space models.

**Personalization**  
The platform is designed to adapt to each student. It tracks solved problems and practice exam performance. Based on this information and on the contests the student is preparing for, the system suggests which topics are weaker and need more training.

Students can also create personalized lists of problems and theory items. These lists can be private or collaborative. The platform can recommend problems for a list based on a topic, contest, or difficulty level. Alternatively, students can create lists completely on their own without recommendations.

The interface for creating lists is interactive and intuitive:

* On the left, a panel shows available problems from a search or recommendation.
* In the middle, a blank canvas allows students to drag and drop problems into the list and arrange their order.
* On the right, a preview shows how the final list will look.

**Groups**  
The platform also supports the creation of groups. Groups can have administrator users and regular members. Within a group, members can share lists, problems, or theory, and even organize contests among themselves. This feature encourages collaboration and teamwork.

**Contests**  
A special module allows students and teachers to create practice exams. Each exam can include both short-answer problems and essay-style problems. The selection of problems can be done manually or generated automatically using filters such as subject area, tags, or difficulty level.

Exams can be set up in two modes:

1. **Casual practice exam** – for personal practice without grading.
2. **Graded exam** – a more formal test that is later reviewed in the grading module.

Organizers can also decide who takes the exam: themselves, another user, a group, or the public. Furthermore, it is possible to design a sequence of exams, each one with its own specific weight in the overall score.

**Grading**  
In the grading module, the exams marked as graded are evaluated. The exam organizer can assign certain problems to specific graders, which may include themselves. Each grader reviews the answers and assigns a score.

If multiple graders give different scores to the same problem, the system notifies them and opens a chat where they can discuss and agree on the final grade. The organizer also decides what information will be visible: only individual results, results for everyone, or no results at all.

**Mobile Application**  
The mobile app mirrors all the functionalities of the web version. In addition, it allows users to save problems or entire lists for offline use, making it convenient for students to study anywhere without needing an internet connection.

**Conclusion**  
This project is designed to make Mathematics Olympiad preparation more effective, interactive, and collaborative. By combining a large repository of problems, personalized recommendations, social interaction, and flexible exam tools, the platform creates a complete ecosystem where students can practice, learn, and improve their skills in a modern and accessible way.