Advanced Campus Cleaning Robot Planning Report

This PDDL model defines a domain for an autonomous cleaning robot navigating a linear environment (classroom ↔ cafeteria ↔ dustbin) to clean two dirty areas with trash, dispose of all trash in the dustbin, and end without carrying trash. The domain includes actions for movement (respecting adjacency), sweeping (dirty to swept), mopping (swept to mopped), picking trash (if present and not carrying), and dropping trash (only at dustbin). Predicates track robot position, room states, trash presence, and carrying status. The problem initializes the robot in the classroom with both areas dirty and containing trash, and the goal requires both areas mopped, no trash remaining in them, and no carried trash.

The generated plan (12 steps) first fully cleans the classroom (sweep, mop), picks its trash, and transports it via the cafeteria to the dustbin for disposal. It then returns to the cafeteria, fully cleans it (sweep, mop), picks its trash, and disposes of it in the dustbin. This sequence respects the single-trash capacity by requiring two disposal trips and leverages the linear layout efficiently without unnecessary backtracking. The plan achieves the goal by ensuring all cleaning and disposal tasks are completed, demonstrating the model's ability to handle multi-step planning with constraints. No obstacles or battery limits are modeled, focusing on sequential task ordering.