Mock test 3: Arduino DC Motor Controller with Sine Wave Modulation
Duration: 2-3 hours

Scenario: You are tasked with developing a DC motor controller for a mechanical oscillation system. The system should vary the motor speed according to a sine wave pattern, creating a smooth oscillating motion. The direction of the motor should change when the sine wave crosses zero. The system should allow for user adjustment of both the maximum speed (via potentiometer) and oscillation frequency (via serial commands).

Requirements:

1. Connect a DC motor driver (L293D) with:
    - PWM control on pin 3 for motor speed
    - Direction control on pin 2 for motor direction
2. Connect a potentiometer to analog input A0 to control the maximum amplitude of oscillation
3. Implement a sine wave function to modulate the motor speed
4. Create a serial interface allowing the user to:
    - Adjust the frequency of oscillation using the command "freq(value)"
    - Perform multiplication calculations using the command "mul(value1,value2)"
5. Change the motor direction when the sine wave crosses zero

Requirement	Description	Complete?
Circuit Assembly	L293D motor driver connected to Arduino pins 2 & 3	☐
Potentiometer Input	Properly connected to A0 for amplitude control	☐
Sine Wave Generation	Functioning algorithm for smooth oscillation	☐
Direction Control	Motor changes direction at sine wave zero-crossing	☐
Serial Command: freq()	Command properly changes oscillation frequency	☐
Serial Command: mul()	Command correctly multiplies two numbers	☐
PWM Output	Motor speed varies according to sine amplitude	☐
Amplitude Mapping	Potentiometer range properly maps to output	☐
Serial Feedback	Appropriate confirmation messages displayed	☐
Code Optimization	No logical errors or inefficient operations	☐