Deliverable B – Function Descriptions

io_hw.py - init_hardware()
• Description: Sets up the Pico's ADC, GPIO, and PWM hardware (placeholder).

io_hw.py - read_x_adc()
• Description: Reads the raw X analog value (0–65535).

io_hw.py - read_y_adc()
• Description: Reads the raw Y analog value (0–65535).

io_hw.py - read_pen_switch()
• Description: Checks if the pen switch is pressed (True = pen down).

mapping_io.py - adc_to_01(raw)
• Description: Converts a raw ADC number (0–65535) to a normalized value (0.0–1.0).

mapping_io.py - map_norm_to_xy(nx, ny)
• Description: Converts normalized values (0–1) to real X/Y positions (mm).

geometry.py - clamp(v, lo, hi)
• Description: Keeps a value inside a lower and upper limit.

geometry.py - ik_two_link(x, y, L1, L2)
• Description: Calculates shoulder/elbow angles to reach point (x, y).

geometry.py - limit_angles(shoulder_deg, elbow_deg)
• Description: Ensures joint angles stay within safe servo limits.

servo_out.py - angle_to_us(angle_deg, min_deg, max_deg, min_us, max_us)
• Description: Converts an angle to servo pulse width (µs).

servo_out.py - set_servos(shoulder_us, elbow_us, pen_us)
• Description: Sends pulse widths to servos (stub).

control.py - one_step()
• Description: Runs one control cycle: reads → maps → IK → limits → converts → outputs.

control.py - main()
• Description: Initializes and loops one_step() at CONTROL_HZ.