Objectives:

- Understand for loops
- Understand arrays and indexing
- Compute sums both with loops and with array syntax.
- Use simple linear fit

Deliverables due no later than 2 days after the end of your lab session:

A MATLAB diary for your laboratory session (25% of your laboratory grade). This should be submitted via blackboard as an assignment no later than 2 days after your lab.

Deliverables due at the beginning of your next lab session (October 29 or 31):

- A lab hard-copy report summarizing your results and including all required files (scripts, plots), but not any data files. Make sure your name is on all pages of your lab report. Document your script profusely with comments. This will be emphasized when grading.

Task 1 of 3

Write a script lab08_a.m that first creates a vector X with N=101 equally spaced values from -25 to 25. Use a for loop to create a set of simulated measurements according to \( Y(i) = -10 + 0.2 \times x(i) + \text{randn} \) where \( i \) is the loop index. The \text{randn} function returns a normally distributed random number that adds some typical measurement noise. Create a scatter plot (Figure 1) of X versus Y (no line, just symbols).

Task 2 of 3

Extend the script to calculate the coefficients \( A_0 \) and \( A_1 \) for a line fit (see lec13.pdf, page 15). Use a for loop to calculate the sums (even if you know a more efficient way). Add the line defined by \( A_0 \) and \( A_1 \) to the plot (Figure 2). Run the code with \( N=1001 \) and \( N=10001 \). Discuss how the results change.

Task 2 of 3 (not required, 50 extra points)

Copy lab08_a.m to lab08_b.m and replace all loops with the corresponding vector statements. That code should produce Figure 3, which must look exactly like Figure 2.