

# ENG TECH 1PR3 Programming Principles

## Arrays

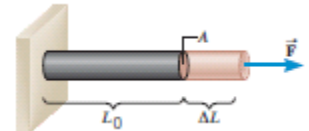
### Lab 06

Be sure to assign all input to appropriate variables. Do NOT use the control name directly in the calculations. Instead, assign the value of a control to a variable and use the variable in the calculations. Assign the result of the calculations to an appropriate form control. Ensure the forms are well-behaved. A form must contain an Exit button, sensible tabbing and alt-shortcuts where appropriate.

- Write a VB program that will find the minimum and maximum value in an array of size **N**. When the user clicks **btnGenerate** button, the program should
  - ask the user to enter the size of array, i.e. the value of **N**
  - randomly generate **N** integers satisfying  $1 \leq \text{num} \leq 1000$  and store into an array
  - display maximum 10 numbers per line in a label control
  - call a sub procedure to find the minimum and maximum value in the array (determine both values in the same procedure)
  - display the minimum and maximum value within **btnGenerate** click event procedure.

- The magnitude **F** (in N) of the force required to stretch an object of length **L<sub>0</sub>** (in m) and cross-sectional area **A** (in m<sup>2</sup>) by an amount **ΔL** (in m) is given by

$$F = (Y \times 10^{10}) \left( \frac{\Delta L}{L_0} \right) A, \text{ where } Y \text{ (N/m}^2\text{) is a constant called Young's modulus}$$



Stretching Force **F**

Write a VB program that will calculate the value of **F** for given user input (**A**, **L<sub>0</sub>**, and **ΔL**) satisfying the following conditions:

$$0.01 \leq A \leq 0.2, 10 \leq L_0 \leq 20 \text{ and } 0 < \Delta L \leq 1.5 \times 10^{-3}$$

Your program should include a listbox control containing material's name and initialize a 1-D array with the values of Young's Modulus given in the table. When the user clicks calculate button, your program should collect user input from textboxes and the value of **Y** for the selected material. Finally, your program should display input values (as entered) and the value of **F** (in exponential form) format to 3 decimal places in a label control.

Values of the Young's Modulus  
of solid materials  
(10<sup>10</sup> is adjusted in formula)

Material	Y
Aluminium	6.9
Brass	9.0
Copper	11.0
Nylon	0.37
Steel	21.0
Teflon	0.037

## **Submitting the Lab**

In order for your Lab/Assignment to be eligible for grading you must submit the following:

- The code must contain your Full Name and Student ID in a comment block at the top of each form module.
- A .zip compressed file containing the entire VB.NET project to AVENUE. Use .zip compression only (no RAR, TAR etc). If there is more than one project, create a separate .zip file for each individual project. Be sure to add all project files and folders to the .zip file. If the compressed file is missing files/folders such that the project will not open or run, the lab/assignment will receive a grade of 0.
- A Word .doc (or .docx) file containing:
  - A cover page that includes your name, Student ID, and MAC ID
  - The form code (event and other subprocedures and functions) including programmer's block
  - Screen captures of the form showing sample input and output.

Upload the Word file and .zip file(s) **separately** to the appropriate assignment drop-box on AVENUE.

Labs and assignments will not be accepted for evaluation if any of the above items are omitted and will result in a grade of 0.