



IC 150P Computation for Engineers Lab

Lab assignment sheet no: 6, Odd semester, 2016

Topic: Arrays

Prepared by: Kaustav Sarkar

Objectives:

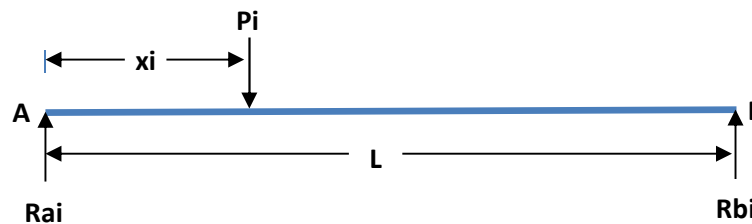
- To learn I/O and arithmetic operations of 1D/2D arrays
- To learn passing of arrays through functions

NOTE: Implement necessary checks for validating inputs in all programs; Use spaces and indentation to improve readability; Provide comments to aid lucid comprehension

Task-1: Write a C program to read a 1D array of n elements from the keyboard and then swap any two user specified elements using a function with pointer arguments. The program should echo the original array and print the revised array on screen.

Task-2: A beam is a structural element which is often used to carry loads acting perpendicular to its length. The following illustration outlines the procedure for computing support reactions in a simply supported beam subjected to a single point load. For a system of n point loads, the reactions can be determined by cumulating the individual cases.

Write a C program, implementing arrays, to calculate the support reactions in a simply supported beam subjected to a system of n point loads. The code should incorporate a separate function for the calculation of support reactions.



Inputs:

1. **L** - span of the beam (m)
2. **Pi** - magnitude of i^{th} point load (kN): upward/downward acting forces are $-/+$
3. **xi** - distance of i^{th} point load from support A (m)

Calculation:

1. **Rbi** - reaction at support B under P_i (kN)
 $R_{bi} = P_i * x_i / L$
2. **Rai** - reaction at support A under P_i (kN)
 $R_{ai} = P_i - R_{bi}$
3. **Ra** - total reaction at support A by applying principle of superposition (kN)
 $R_a = \sum R_{ai}$
4. **Rb** - total reaction at support B by applying principle of superposition (kN)
 $R_b = \sum R_{bi}$

Check: The correctness of results can be checked using the condition: $\sum P_i = R_a + R_b$

Extend the program by adding another function to calculate shear force, V (kN) at any given section situated at a distance of x (m) from support-A. Given that, $V = R_a - \sum P_i$ for all $x_i < x$

Task-3: Write a C program to perform addition and multiplication of two matrices.

The code should encompass separate functions for the two operations, have necessary compatibility checks and produce appropriately formatted output on the screen. [Hint: use of %10.2f etc.]