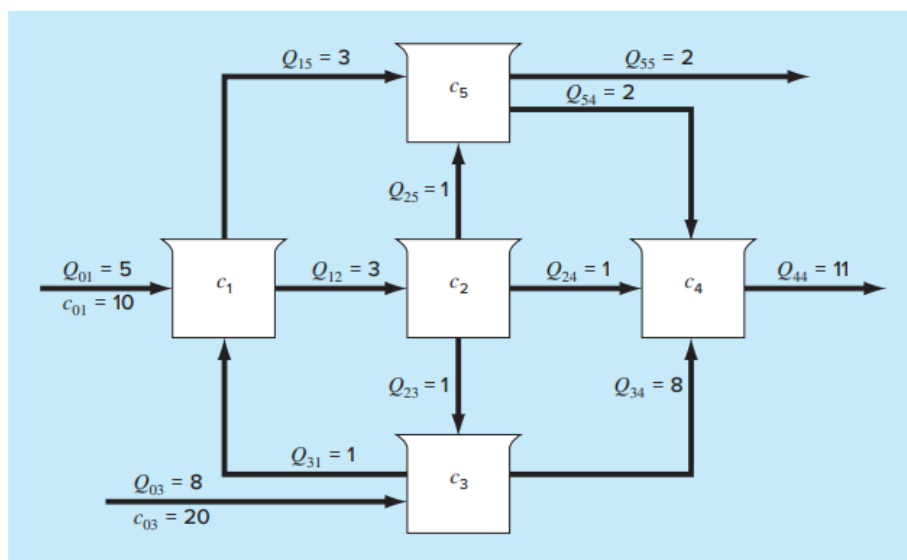


CH2013: Computational Programming and Simulations Lab
July-Nov 2023
Problem Sheet #7b

27 September 2023

1. Mass balance is an essential tool in engineering problem-solving, enabling us to represent inputs and outputs using measurable variables and parameters. For instance, in the context of a reactor where we are conducting a mass balance for a conservative substance (meaning it doesn't undergo chemical transformations), it is crucial to determine the mass flow rates entering the reactor through inflow pipes and exiting through the outflow pipe. This determination can be accomplished by calculating the product of the flow rate Q (measured in cubic meters per minute) and the concentration c (measured in milligrams per cubic meter) for each of the inflow and outflow pipes.



- a) Develop mass balance equations for the given system, assuming the system is in the steady state.
 - b) Solve these resulted systems of linear equations by
 - I. Gauss Jordan
 - II. Jacobi iterative method
 - III. Gauss – Seidel method
 - c) Comment on the number of iterations and solution obtained
-
2. Use Müller's method to find the roots of the polynomial with initial guess of 2.5, 12, 50

$$x^3 - 6x^2 + 11x - 6$$
 - a) Save the iteration, new root estimates and the error estimate.
 - b) What are the advantages of this method compared to polynomial deflation you debugged in Mid Semester Exam.