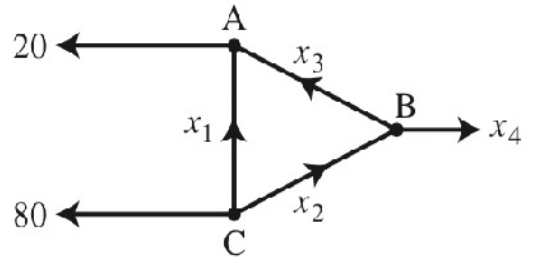


Math 002B Assignment 1.6

1. Consider an economy with three sectors, Chemicals & Metals, Fuels & Power, and Machinery. Chemicals sells 30% of its output to Fuels and 50% to Machinery and retains the rest. Fuels sells 80% of its output to Chemicals and 10% to Machinery and retains the rest. Machinery sells 40% to Chemicals and 40% to Fuels and retains the rest.
 - a. Construct the exchange table for this economy.
 - b. Develop a system of equations that leads to prices at which each sector's income matches its expenses. Then write the augmented matrix that can be row reduced to find these prices.
 - c. Find a set of equilibrium prices when the price for the Machinery output is 100 units.

2. Alka-Seltzer contains sodium bicarbonate (NaHCO_3) and citric acid ($\text{H}_3\text{C}_6\text{H}_5\text{O}_7$). When a tablet is dissolved in water, the following reaction produces sodium citrate, water, and carbon dioxide (gas):
$$\text{NaHCO}_3 + \text{H}_3\text{C}_6\text{H}_5\text{O}_7 \rightarrow \text{Na}_3\text{C}_6\text{H}_5\text{O}_7 + \text{H}_2\text{O} + \text{CO}_2.$$
Balance the chemical equation using the vector equation approach, then create a homogeneous system of equations and find the smallest coefficients that satisfies the balanced equation.

2. Find the general flow pattern of the network shown in the figure. Assuming that the flows are all nonnegative, what is the largest possible value for x_3 ?



3. Intersections in England are often constructed as one-way "roundabouts," such as the one shown in the figure. Assume that traffic must travel in the directions shown. Find the general solution of the network flow. Find the smallest possible value for x_6 .

