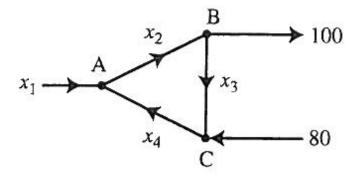
1. Balance the chemical equations:

a)
$$Al_2O_3 + C \rightarrow Al + CO_2$$

b)
$$H_3O + CaCO_3 \rightarrow H_2O + Ca + CO_2$$

c)
$$PbN_6 + CrMn_2O_8 \rightarrow Pb_3O_4 + Cr_2O_3 + MnO_2 + NO$$

2. Find the general flow pattern of the network shown in the figure. If all flows are non-negative, what is the smallest possible value for x_4 ?



3. Find the general flow pattern in the figure given below. Which of the paths, $x_1,...,x_5$ can be closed? For those that can, what is the flow on the rest of the network when they are closed?

