Transit Origin-Destination Estimation

The Purpose

The purpose of this exercise is to estimate the transfer volume of passengers at a transfer station. Transfer volumes are important information for designing station area including the corridors, escalators/elevators, platform size, and control of passenger flow.
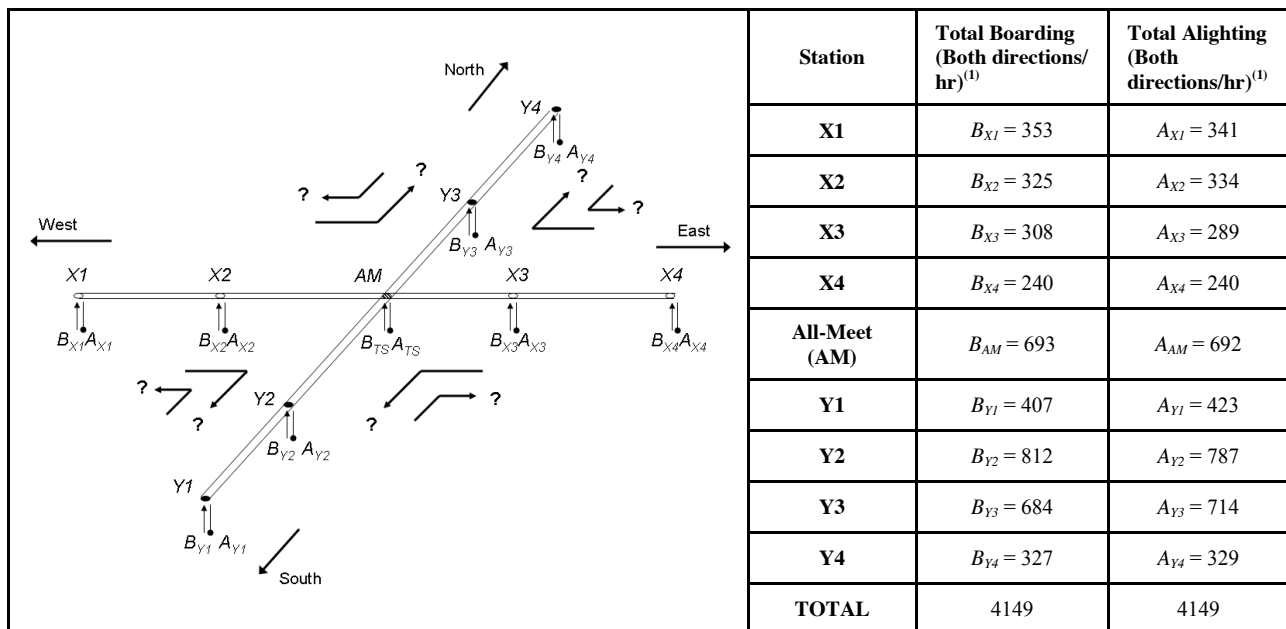
The Problem Set Up – Transit Network.

Consider a very simplified transit network as shown below. Two metro lines intersect at station All-Meet (*AM*). The two lines are called East-West line and North-South line, as shown in Figure 1. The non-directional boarding counts (B_i) and alighting counts (A_i) are available at each station.

The Problem
Estimate the number of passengers transferring at a transfer station (*AM*) from West to North, from West to South, from East to North, from East to South, from North to West, from North to East, from South to West, and from South to East. No transfer is necessary to travel, East →West, West →East, North→South, and South→North.

Clearly present your assumptions, problem formulation, the model, and the solution. Critically review your solution process in terms of its strengths and weaknesses.

Station	Total Boarding (Both directions/ hr)[1]	Total Alighting (Both directions/hr)[1]
X1	$B_{X1} = 353$	$A_{X1} = 341$
X2	$B_{X2} = 325$	$A_{X2} = 334$
X3	$B_{X3} = 308$	$A_{X3} = 289$
X4	$B_{X4} = 240$	$A_{X4} = 240$
All-Meet (AM)	$B_{AM} = 693$	$A_{AM} = 692$
Y1	$B_{Y1} = 407$	$A_{Y1} = 423$
Y2	$B_{Y2} = 812$	$A_{Y2} = 787$
Y3	$B_{Y3} = 684$	$A_{Y3} = 714$
Y4	$B_{Y4} = 327$	$A_{Y4} = 329$
TOTAL	4149	4149

Consider $T_{Xi,Xi} = 0$ for all i, $T_{Yi,Yi} = 0$ for all i; $T_{AM,AM} = 0$, where $T_{i,j}$ is the number of trips between stations i and j.

Note:
   (1) Total boarding is the total number of passengers arrived at the station in one hour. Total alighting is the total number of passengers alighted at the station in one hour.