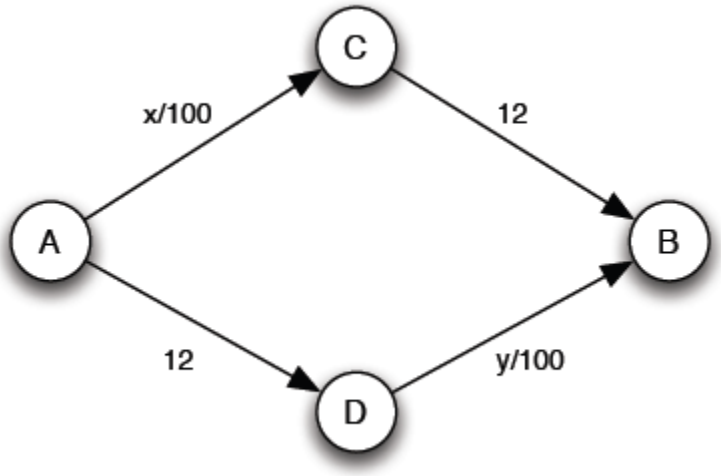
You need to give reasoning of how you derive your answers. No mark if no reasoning is given.

Question 1



1000 cars travel from A to B. There are two possible routes: the upper route through C or the lower route through D. Let x be the number of cars traveling on the edge (A, C) and let y be the number of cars traveling on the edge (D, B). The directed graph in the Figure indicates that the travel time of a car on edge (A, C) is x/100 if there are x cars on edge (A, C), and similarly the travel time of a car on edge (D, B) is y/100 if there are y cars on edge (D, B). The travel time of a car on edges (C, B) and (A, D) is 12 regardless of the number of cars on these edges.

Each driver wants to minimize his travel time. The drivers make simultaneous choices.

(a) Find the Nash equilibrium of x and y.

(b) Now the government builds a new one-way road from town C to town D, with a travel time of 0. Find the Nash equilibrium of x and y.

(c) Suppose now that the conditions on edges (C, B) and (A, D) improves so that the travel time on each edge is reduced to 5. The road from C to D that was constructed in part (b) is still available. Find the Nash equilibrium of x and y.

Question 2

Suppose we have 3 sellers a, b and c, and 3 buyers x, y and z. Each seller has a car park for sale, and the valuations of the buyers are as follows.

Buyer	Valuation on a's car park	Valuation on b's car park	Valuation on c's car park
X	6	5	2
Y	7	6	3
Z	6	7	6

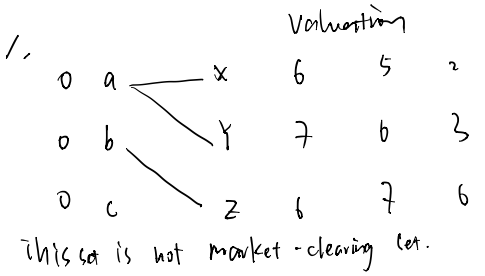
There are 4 sets of prices for a's, b's and c's car parks.

1. a=0, b=0, c=0
2. a=2, b=1, c=0
3. a=0, b=1, c=0
4. a=3, b=1, c=0

How many sets are market-clearing prices? B

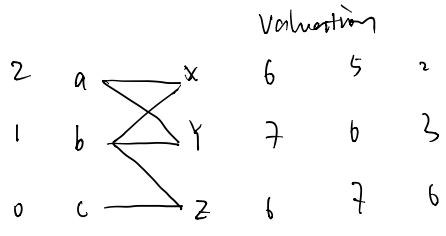
A. 0
B. 1
C. 2
D. 3
E. 4

1.



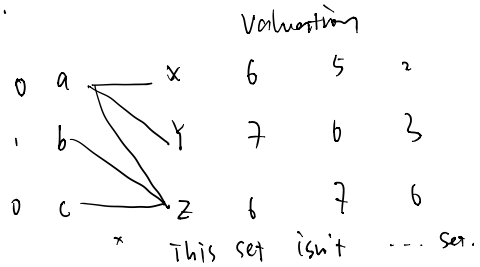
This set is not market-clearing set.

2.



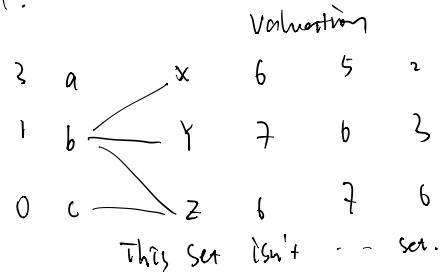
This set is market-clearing set.

3.



This set isn't ... set.

4.



This set isn't ... set.

So there's only 1 set satisfies.