Pset3

izd3

1.)I truly believe using the bidding agent would be a horrible idea. For one while it might seem nice that you can easily just input what your maximum bid at the time is and just return to see if you won or not.

inputting the bid is not the problem however, it's the fact that you cannot stop or change your bid after the auction has begun. It ignores the entire aspect of human strategy from itself. That's also why I believe the example of the formula b=100(N-1)/N is horrible. Having a fixed formula for an auction is bad, because as I said humans have different strategies, and confining bidding to something that simplistic is wrong. What if during an auction you realize that the highest bid is coming too close to your maximum bid, to the point where you believe it won't be worth continuing all because there were many bidders present, well you can't stop it now because of the bidding agent, or the inverse where since there is very few amount of bidders present you maximum bid value is set far away from your maximum value. This formula is too dependent on the number of bidders present,and also because of the nature of humans I feel like there is no correct number in order to make this agent work, all because the human side is not factored in at all.

2.)

a)

i) (100, 100), (100, 80), (80, 100), (80, 80) are all the pairs of the individuals buying at a probability of 1/4 each, since we want the instances for when the item is bought at $100, we look at each pair that makes this possible which are (100,100),(100,80),(80,100)

$$Probabilty(postprice100) = \frac{1}{4} + \frac{1}{4} + \frac{1}{4} = \frac{3}{4}$$

ii)

$$ExpectedRevenue = (\frac{3}{4} * 100) + (\frac{1}{4} * 50) = 75 + 12.5 = 87.5$$

b)

i) Since this is a second price auction it would be best if each person bids their true value, so the pairs would be:

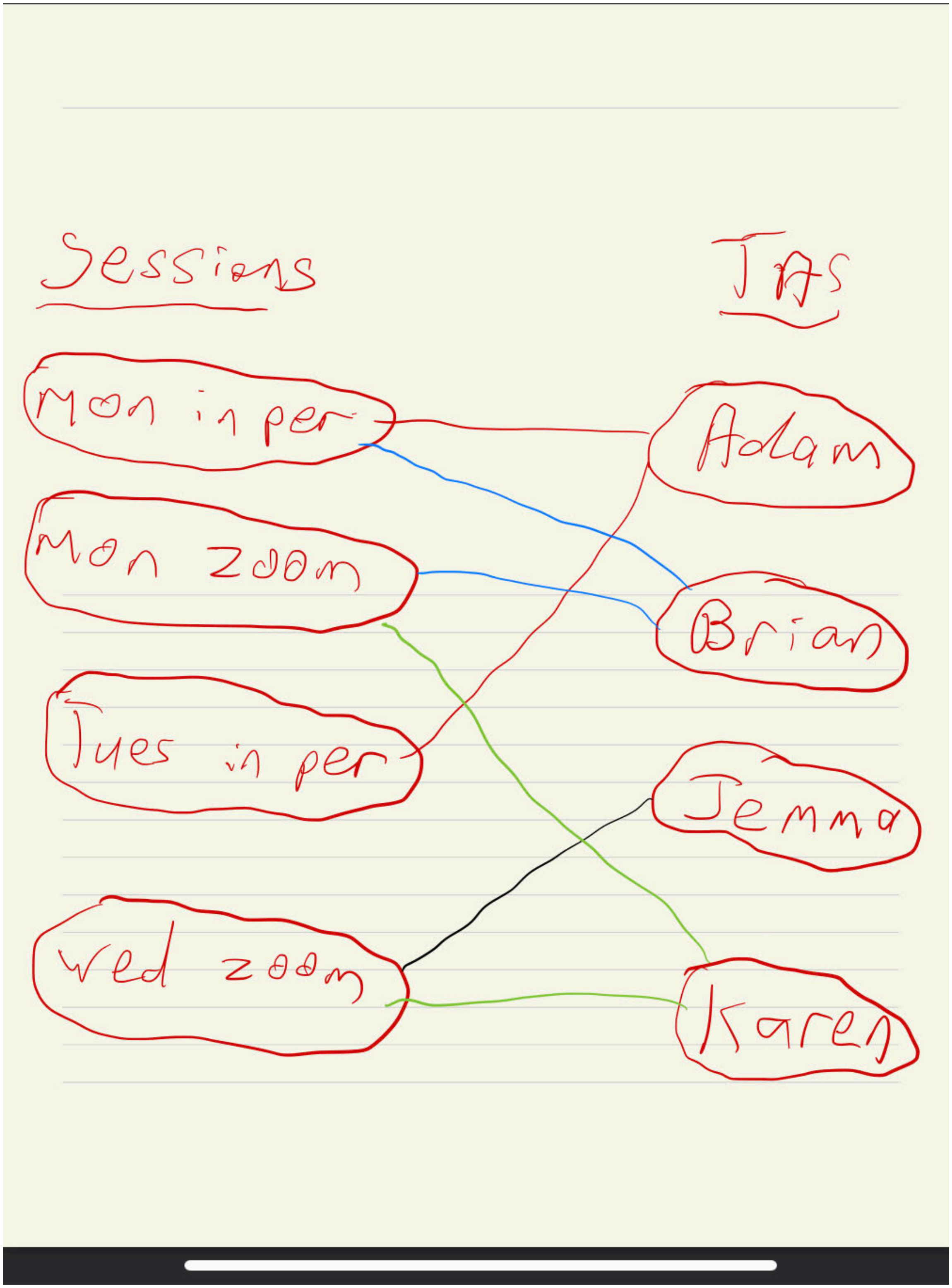
- (100, 100): Both will bid $100.
- (100, 80): The first person will bid $100, and the second person will bid $80.
- (80, 100): The first person will bid $80, and the second person will bid $100.
- (80, 80): Both will bid $80.

ii)

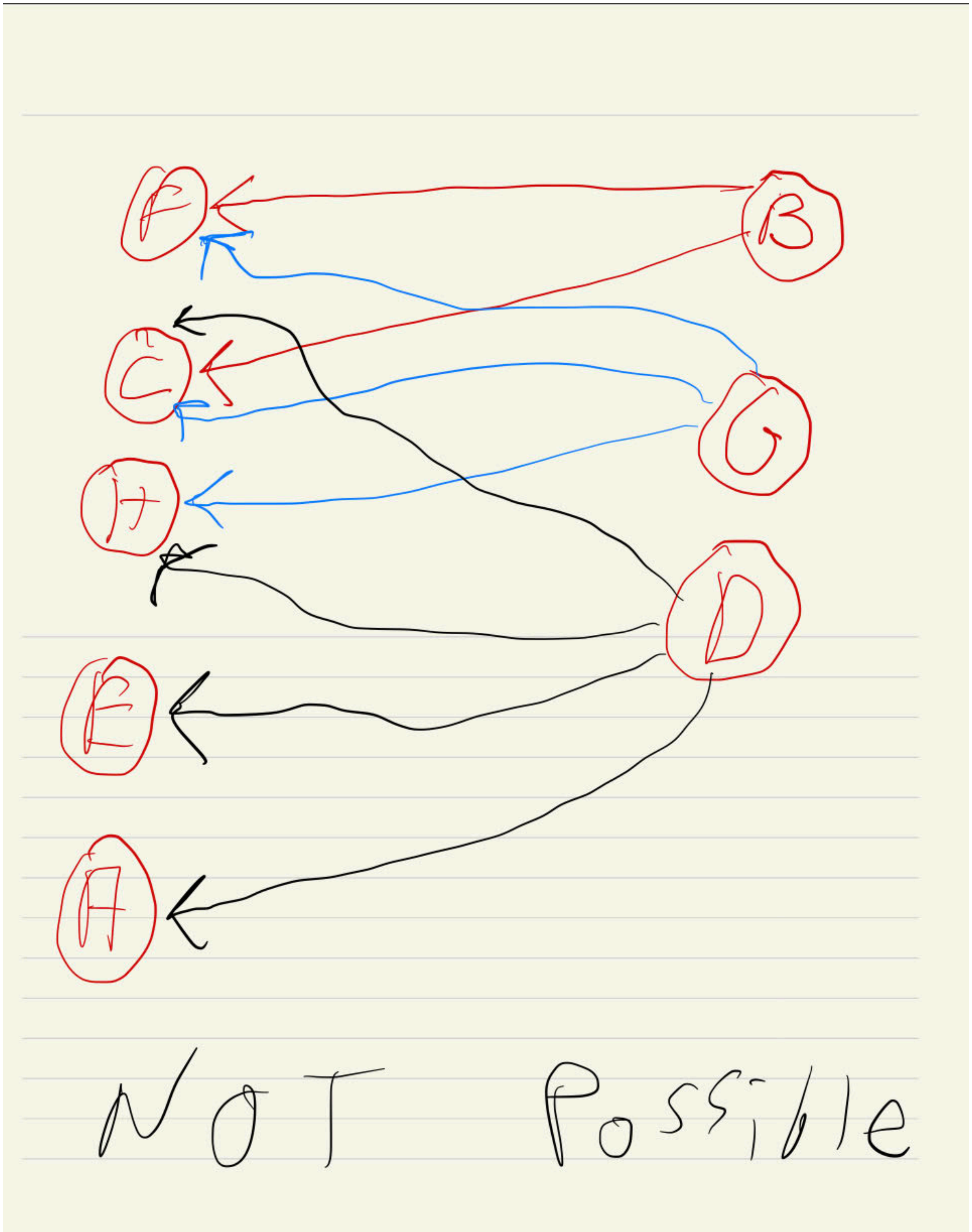
$$ExpectedRevenue = \frac{1}{4} * 100 + \frac{1}{4} * 80 + \frac{1}{4} * 80 + \frac{1}{4} * 80 = 25 + 20 + 20 + 20 = 85$$

3.)

a.)


Sessions
TAs
Mon in per
Mon zoom
Tues in per
Wed zoom
Adam
Brian
Jemma
Karen

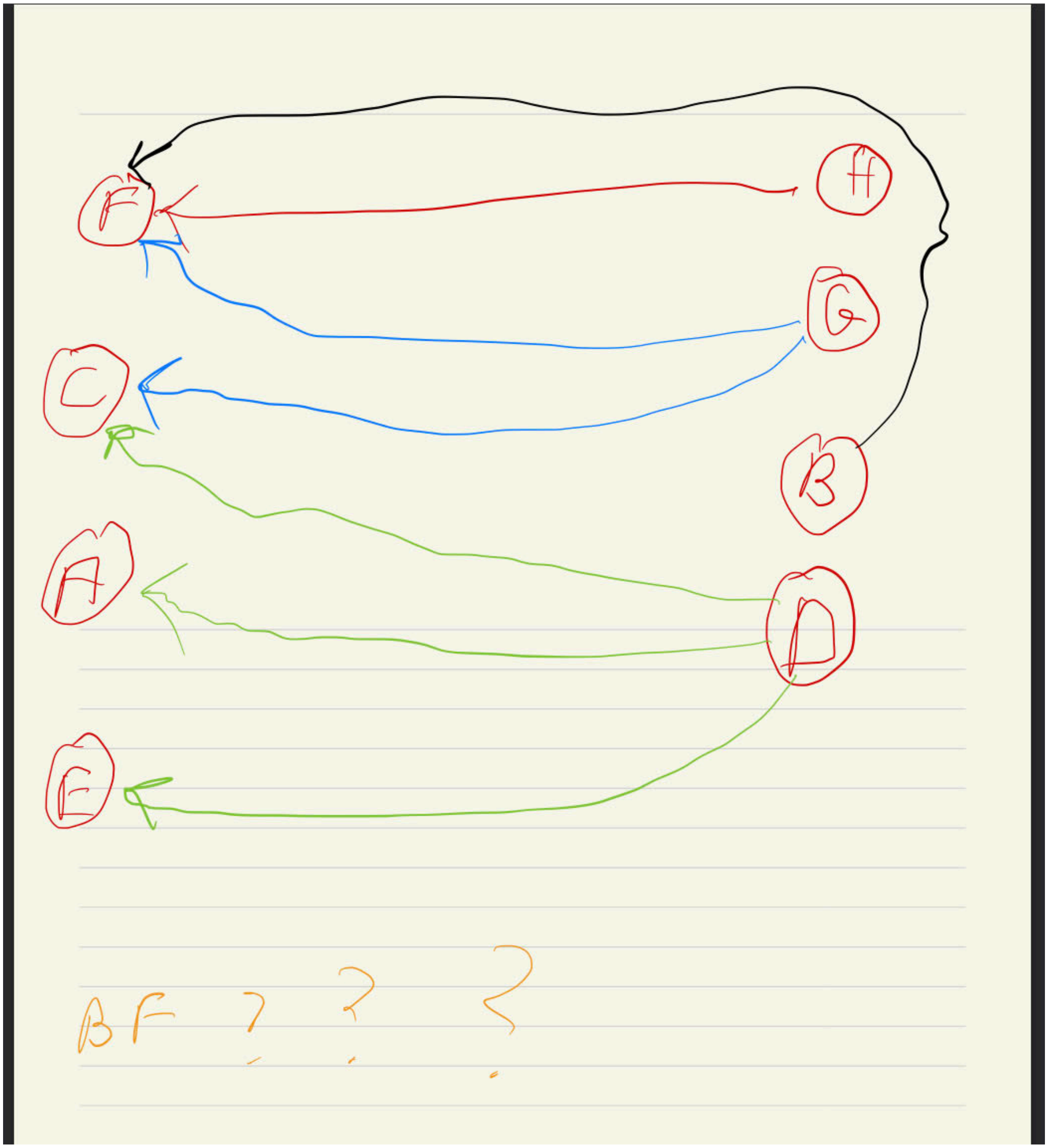
From this graph, we can clearly see that a perfect matching can occur with this information. Simply put as Adam can only attend in-person sections then his only options are the ones on Tuesday and Monday. By assigning him the one on Tuesday it gives Brian, a TA who could only do sections on Mondays a chance to take that Monday in person section. His other option was a Monday Zoom session but that was given to Karen who can only do Zoom sections, with her other option being a Wednesday Zoom section which was finally given to Jemma in the end as she can only attend sessions on Wednesdays.



b.)

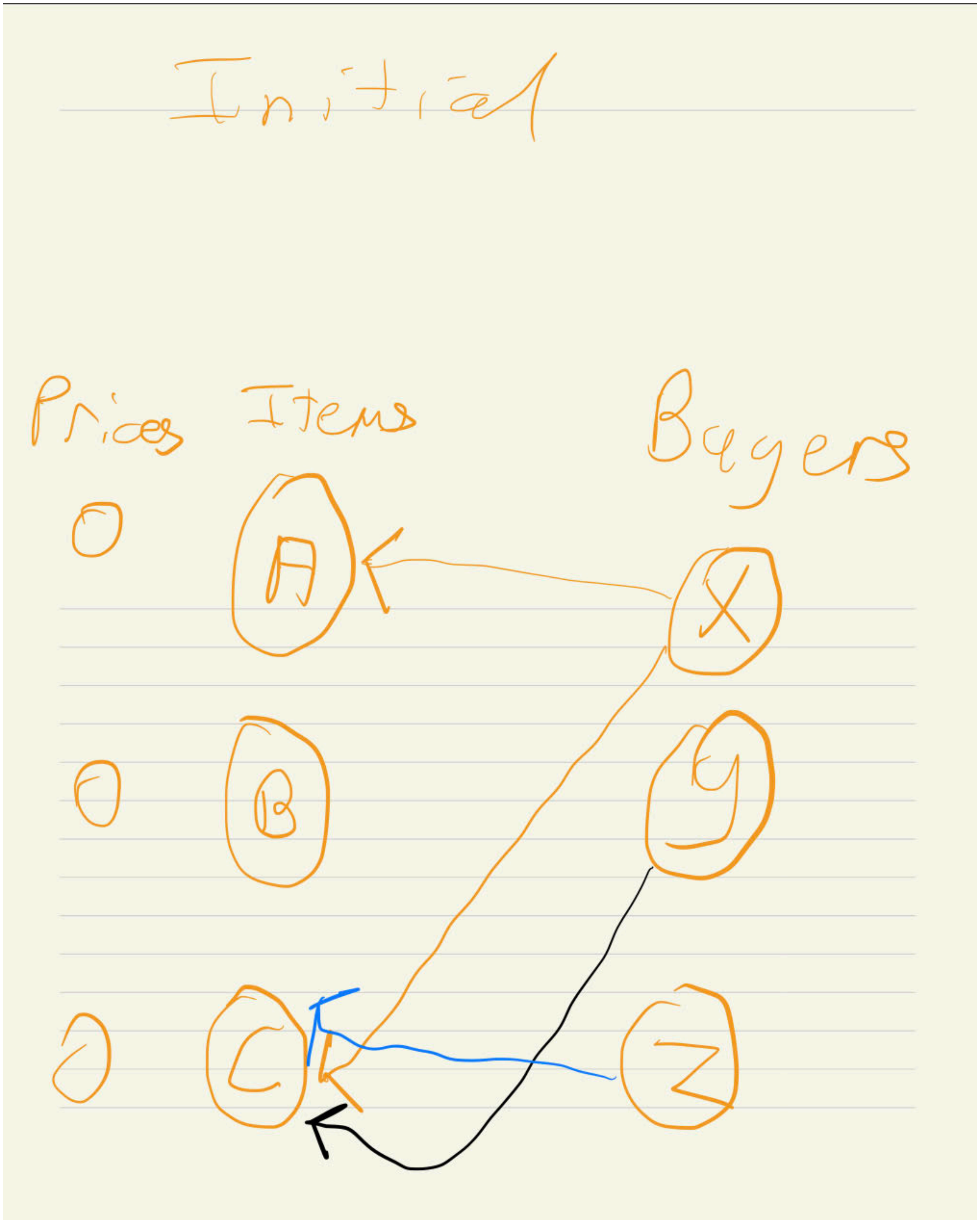
When looking at the nodes we have node B, with edges to nodes F and C, node G with edges to nodes F,C, and H, and finally node D with edges to nodes C, H, E, and A. From this we can see that perfect matching does not occur as not every square have a viable combination, node G is the only one connected to nodes E and A, making it impossible to form a perfect match.

c.)

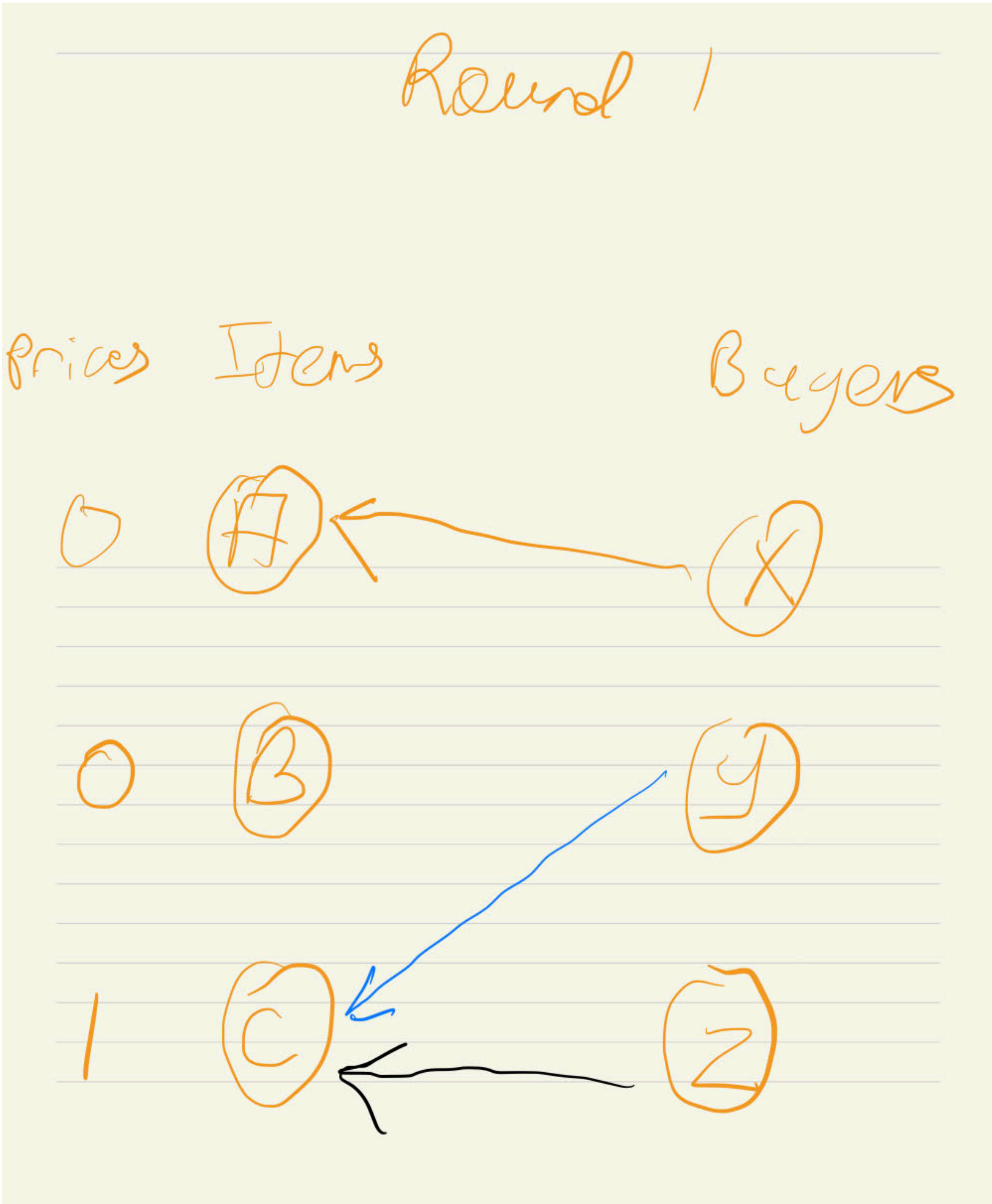


From the graph, we have node H which has an edge to node F, node B which has an edge to node F, node G which has an edge at nodes F, and C. Finally node D which has an edge to nodes C, A, E. Now it is impossible to form a perfect matching as both nodes B and H go to node F only coupled with the fact that node G also goes to node F, with its only other option being node C, which makes it so that there are three nodes essentially going after a node. Finally, node D also connects to node C but is also exclusively connected to nodes A and E, which also makes it so that one of those nodes will always be left out.

4)

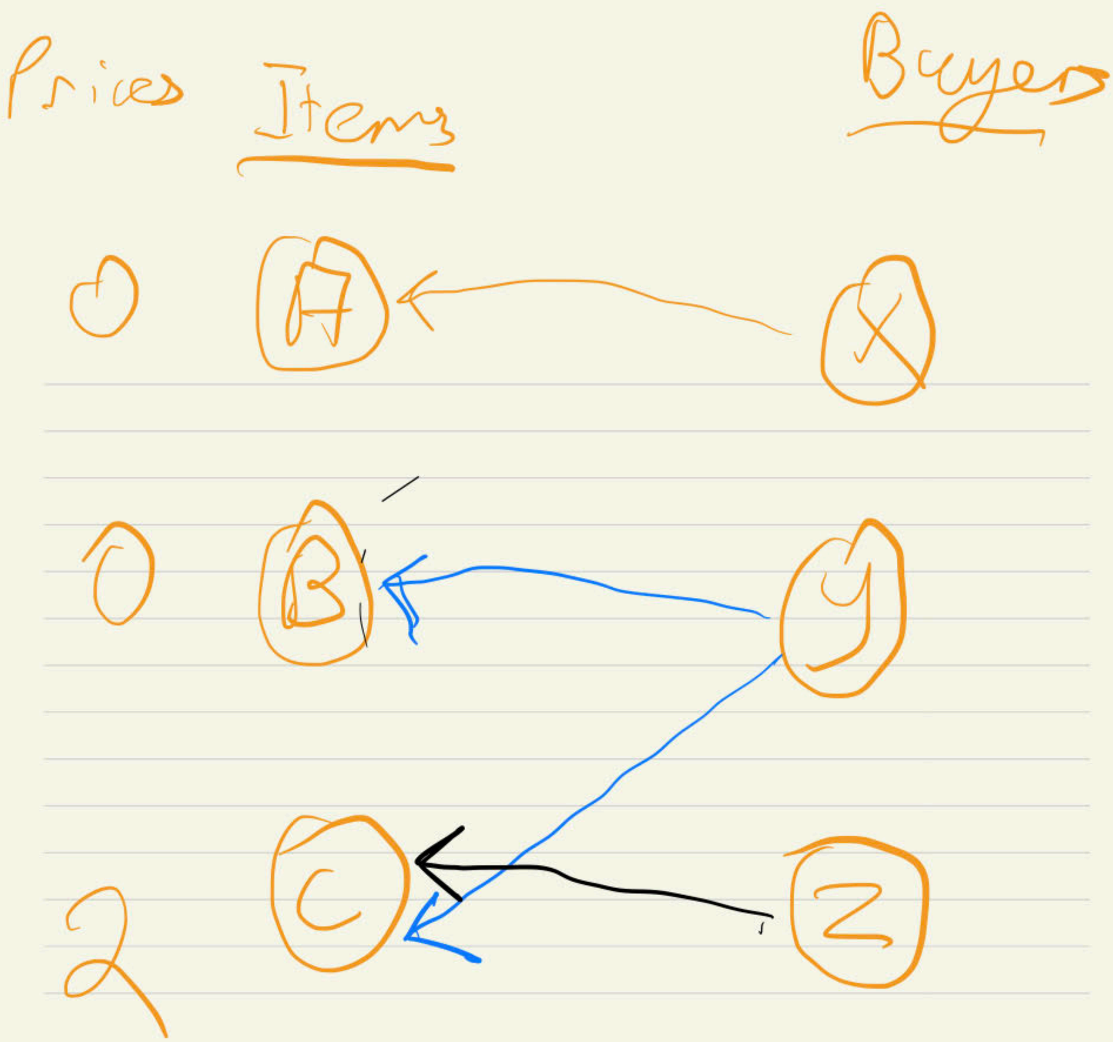


a.)


Round 1
Prices
Items
Buyers
0
A
X
0
B
y
1
C
Z

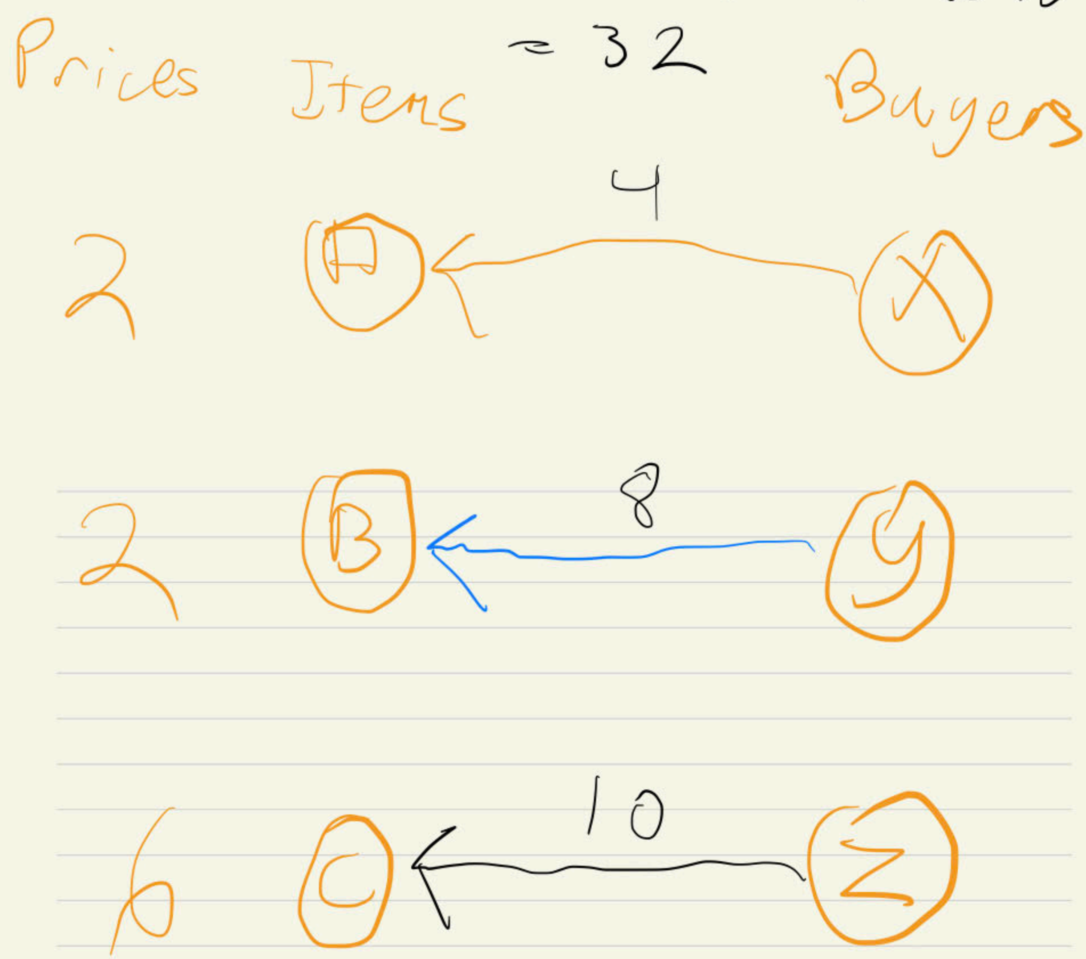
Round 2

final market price $= 6 + 10 + 14 + 2 = 32$



b.)

market price = 2+2+6+4+8+10
= 32



b.)

$t = 1$

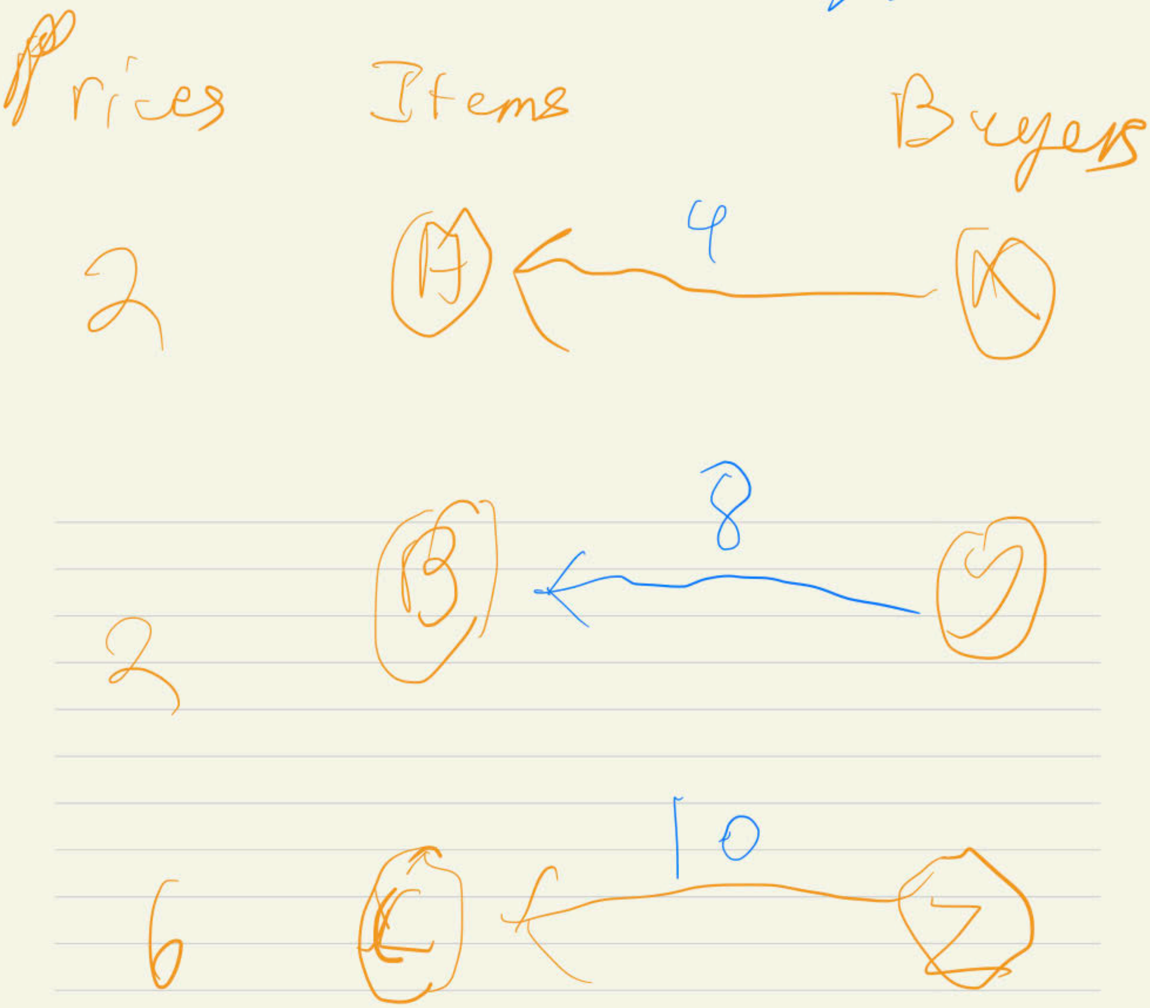
Buyers	Values A	B	C
x	6	4	6
y	4	10	12
z	7	2	16

$t = 2$

x	6	4	6
y	6	10	12
z	8	2	16

market price $= 2+2+6+8+4+10$

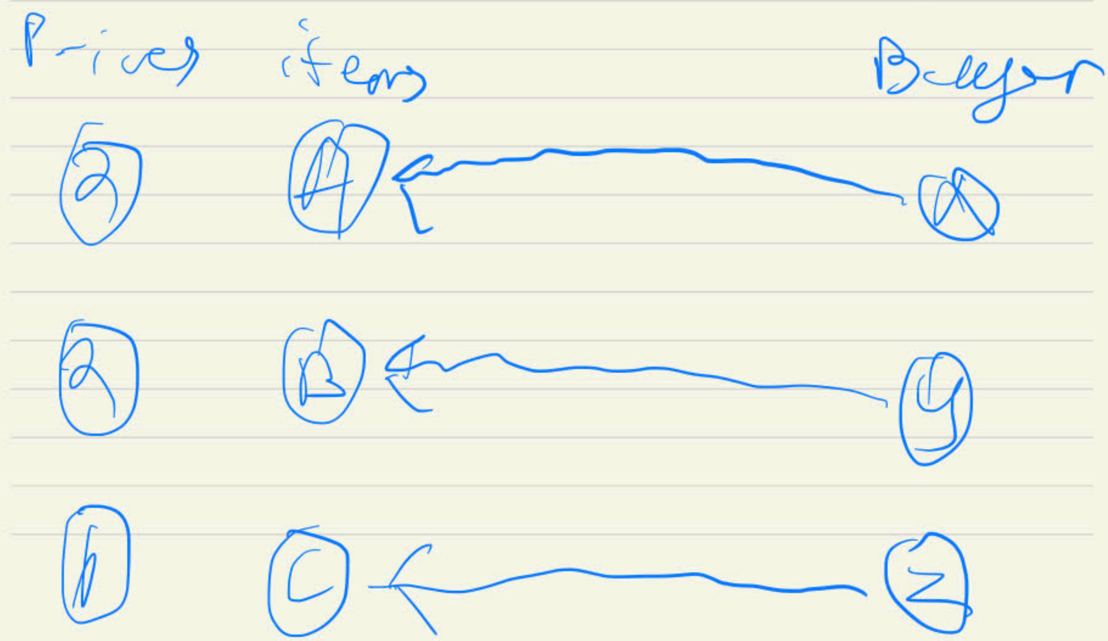
$= 32$



$c = 3$

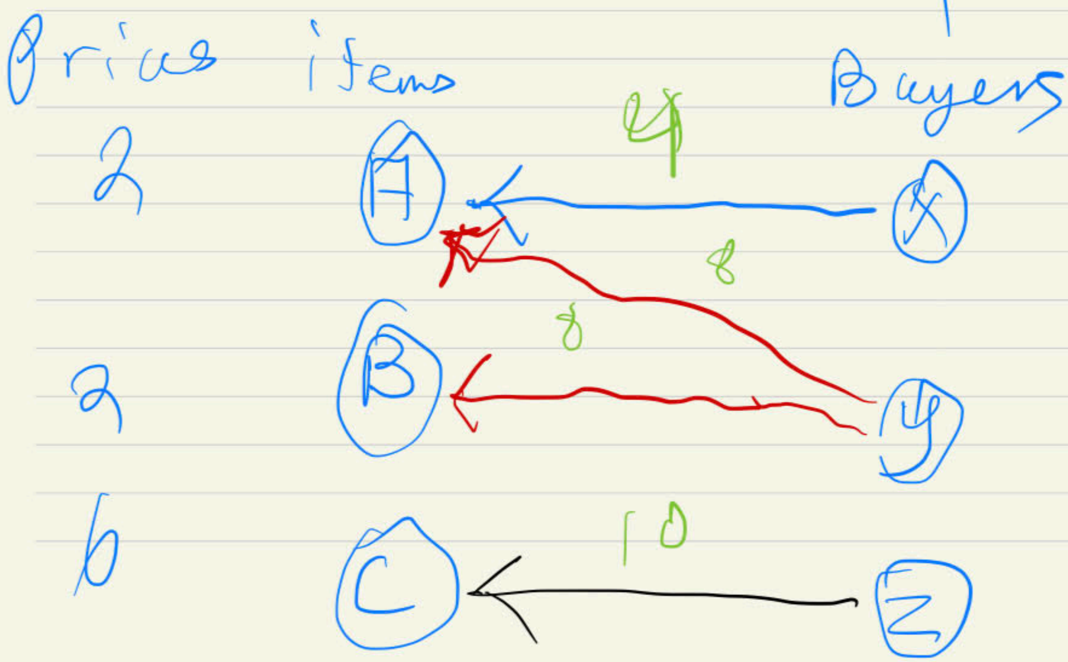
Value items

Buyers	A	B	C
x	6	4	6
y	8	10	12
z	9	2	16



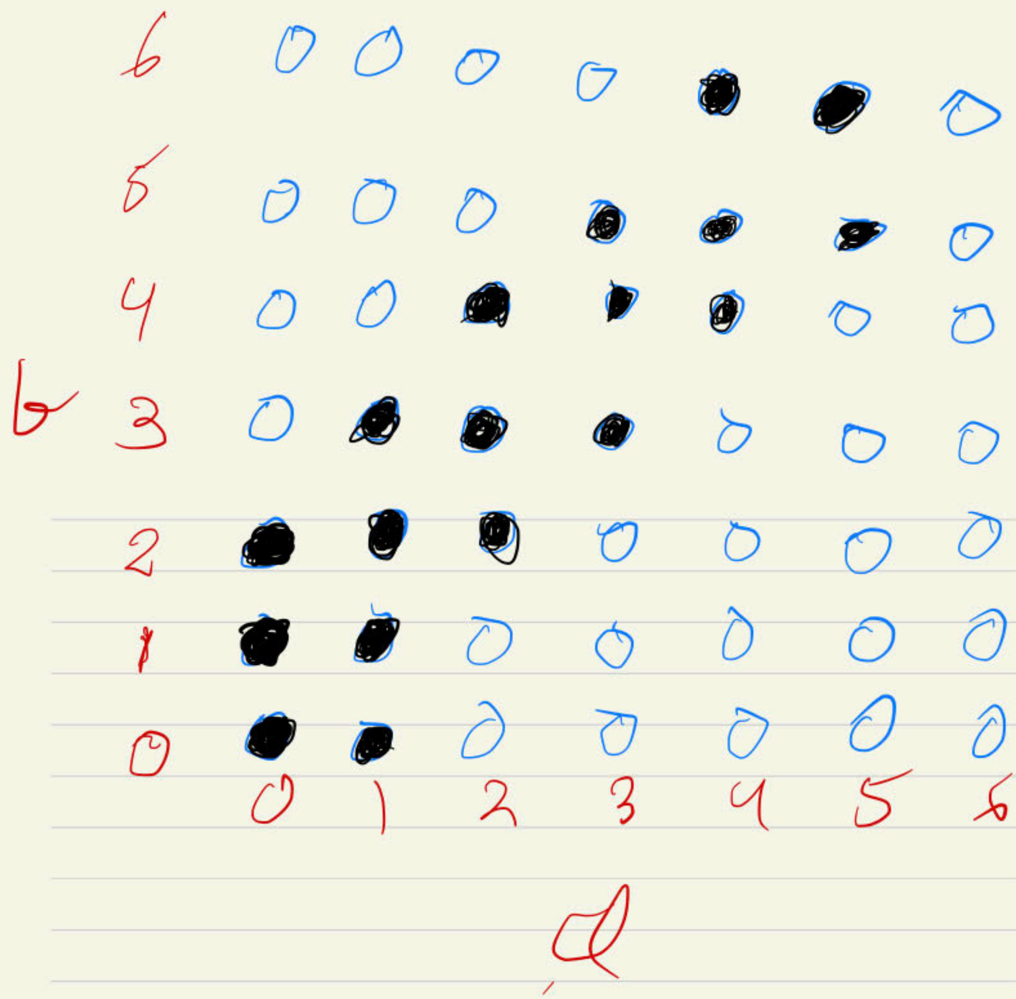
C ≃ 4

Buyers	Value A	B	C
X	6	4	6
Y	15	10	12
Z	10	2	16



The range of t has to be [0,4] in order for us to keep a market clearing with (2,2,6)

5.)



a.)

b.)

The upper parallel line represents when both b values for the buyers are lower than the a values for both buyers. At this point (ex (0,2)), one buyer has an equal preference for both items but if we increase the price of b anymore (ex (0,3)), neither buyer will want item b. The lower parallel line represents when both b values for the buyers are higher than the a values for both buyers. At this point (ex (2,2)) one buyer has an equal preference for both items but if we decrease the price of b (ex (2,1)), both buyers will prefer item B and there will not be a match.