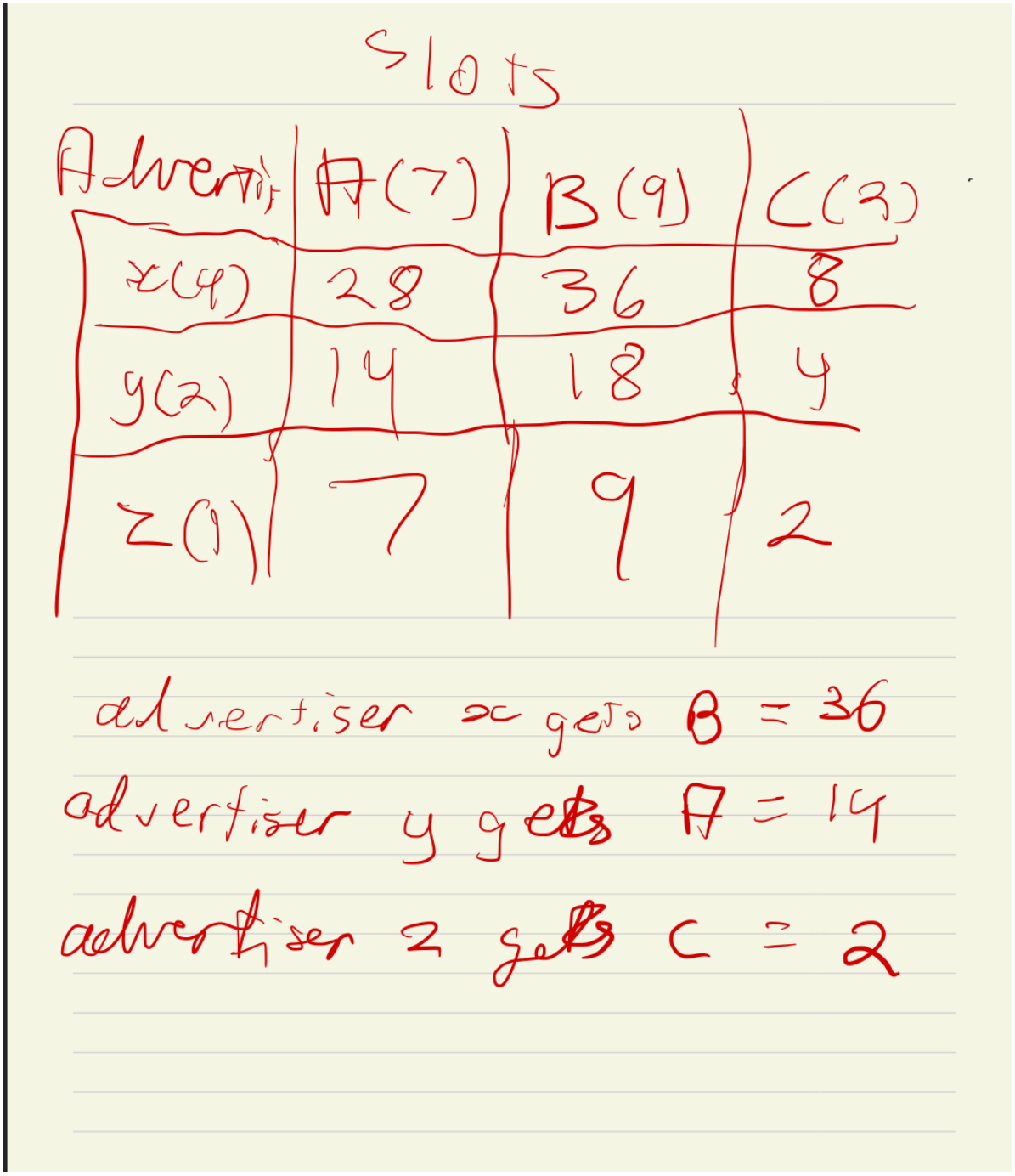
PSET 5

Izd3

1.



a)

b)

In this case, since there are three spaces and three promoters, each advertiser gets a space in

any case. Hence, no advertiser causes any hurt to others by partaking in the sell-off. Hence, all advertisers pay a cost of zero in this VCG Method.

2.

a)

Buyer Y would win the auction and will pay the price of 8

b.)

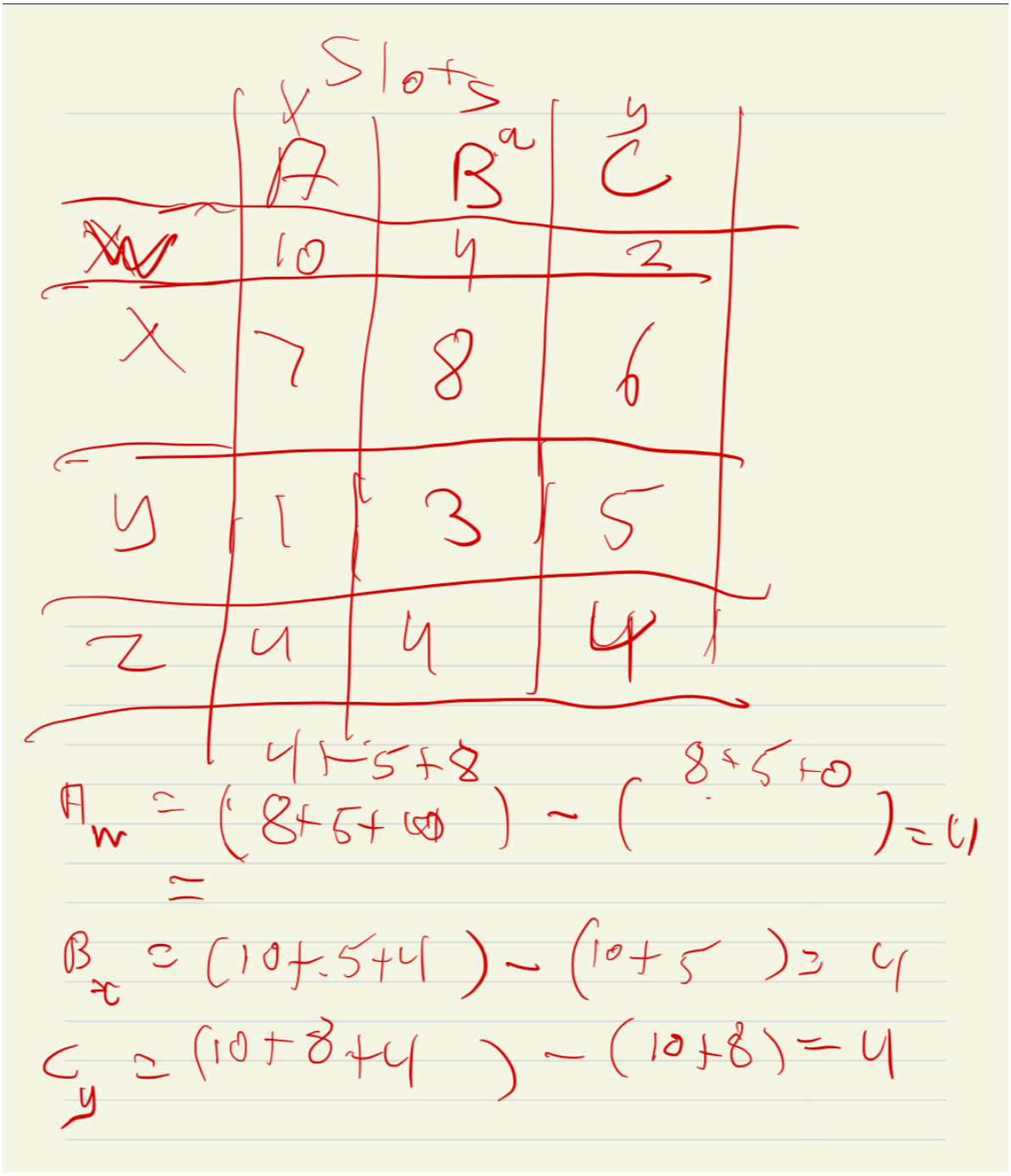
- Buyer y takes A 10

Prices:

- Buyer y: =8
- Buyer x and z does not receive any items

If y wasn't in the auction, the item would have gone to x who would pay 8, so y pays the harm which would be 8.

3.)



a.)

b.)

These prices are similar because they all do equally as much harm, the true culprit of this however is buy z which has a value of 4 across all the items, so whenever we take the harm

price z always ends up making all the values go to 4

4.

a)

- X will take slot A at 25
- Y will take slot B at 12
- Z will take Slot C at 6

Prices:

- Advertiser x pays (15+8)-(12+6)=23-18=5
- Advertiser y pays (25+8)-(25+6)=33-31=2
- Advertiser z pays (25+12)-(25+12)=37-37=0

b.)

1. Advertiser w would be assigned to slot D as it causes the least amount of harm

Advertiser x cannot precisely determine the value of v based on the information provided. Advertiser x knows that advertiser w has the smallest value per click but doesn't have enough information to determine the exact value. Advertiser x only knows they are paying 3 more for slot a compared to their initial allocation in part (a), but this doesn't provide enough information to deduce the precise value of v.

5.)

a)

In this generalized second price auction, it is not a Nash equilibrium for each advertiser to bid their true value per click. Let's consider the bids as described:

- Advertiser x bids 10 per click.
- Advertiser y bids 9 per click.
- Advertiser z bids 6 per click.

So, it is a Nash equilibrium as each advertiser has no benefit from deviating from bidding their true value. X has the highest bid value possible so in essence, they would always bid their max as they are guaranteed to win and pay a price lower than their true value. Y should always bid 9 as it's guaranteed to at least pay the third highest bid, they would only lose or win by 1 when competing with x but if they obtain slot B, they would be making a profit of 3 guaranteed from Z.

b.)

No, it is not a Nash equilibrium because:

- Advertiser x can benefit from deviating and bidding 10 per click instead of 9. This way, they will still get slot A but pay a lower price (6 per click), increasing their utility

c.)

it is a Nash equilibrium because:

- Advertiser x cannot benefit from deviating. Bidding higher would increase their cost, and they cannot secure a better slot (they already have slot a).
- Advertiser y cannot benefit from deviating. Bidding higher would increase their cost, and they cannot secure a better slot (they already have slot b).
- Advertiser z cannot benefit from deviating. Bidding higher would increase their cost, and they cannot secure a better slot (they already have slot c).

In this case, no advertiser can improve their outcome by deviating, so the proposed bids form a Nash equilibrium.