Intro to Contemporary Math

Envy, Perception, and Intro to Adjusted Winner

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?(4.1) Warm up (Compensation)

	Tim	Shawn	Leo
Bids on Car:	\$13,500	\$12,000	\$9,000

Shawn wins the car, and he decides to **pay Tim \$4,500 and Leo \$3,500.**
Match the compensations.

1) x_{Tim}
2) x_{Leo}
3) x_{Shawn}

A) $-8{,}000$
B) 3,500
C) 4,000
D) 4,500
E) 12,500
F) 18,000

Warm up Answers

$$x_{Tim} = \underbrace{0}_{\text{No Item}} + \underbrace{4,500}_{\text{From Shawn}} = 4,500$$

$$x_{Leo} = \underbrace{0}_{\text{No Item}} + \underbrace{3,500}_{\text{From Shawn}} = 3,500$$

$$x_{Shawn} = \underbrace{12,000}_{\text{Shawn's winning bid}} - \underbrace{4,500}_{\text{Pay Tim}} - \underbrace{3,500}_{\text{Pay Leo}} = 4,000$$

Agenda

- Envy and Perception
- Adjusted Winner
  - Setup
  - First Round of Items
  - Point Ratios

Announcements

- Homework due next Monday
- Mini-Exam next Wednesday

View of Others Compensation 1

Actual compensation formula:

$$(\text{Value of items WON}) \pm (\text{Cash received or paid})$$

However, the value of items won is based on the **winning bids**.

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$$\begin{array}{ll} & \text{Viewer's bids on items other person won} \\ \pm & \text{Other person's cash receipts/payments} \end{array}$$

View of Others Compensation 2

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Viewer's bids on items other person won

$\pm$ Other person's cash receipts/payments

This gives what the viewer **thinks** the other person got (what the other person's compensation is), or in other words, the viewer's **perception** of the other person's compensation.

View of Others Compensation 3

Viewer's bids on items other person won

$\pm$ Other person's cash receipts/payments

This gives what the viewer **thinks** the other person got (what the other person's compensation is), or in other words, the viewer's **perception** of the other person's compensation.
If the viewer thinks the other person's compensation is more than his/her own, the viewer will **envy** the other person.

Perception Hints for Scenarios with One Item 1

"Winner" refers to the person who won the item, and "Loser" refers to everyone else involved.

- Loser 1 looking at Loser 2: Loser 1 sees Loser 2's cash payment of

$$x_{Loser\ 2} = \text{Winner's payment to Loser 2}$$

- Loser 2 looking at him/herself: Loser 2 sees his/her own cash payment of

$$x_{Loser\ 2} = \text{Winner's payment to Loser 2}$$

In these cases, the person being viewed only has cash. Everyone agrees on the value of cash.

Perception Hints for Scenarios with One Item 2

- Winner looking at him/herself: Winner sees item won and payments

  x_{Winner} = Winner's bid minus ALL payments to losers

- Loser looking at Winner: Loser sees item and payments

  LOSER'S OWN BID minus ALL payments to losers

  Each person uses his/her own bid on the item when they view it.

Car Trouble Envy Example 1

	Tim	Shawn	Leo
Bids on Car:	\$13,500	\$12,000	\$9,000

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$$x_{Shawn} = \underbrace{12,000}_{\text{Shawn's winning bid}} - \underbrace{4,500}_{\text{Pay Tim}} - \underbrace{3,500}_{\text{Pay Leo}} = 4,000$$

Leo bid less than Shawn did, so he thinks Shawn got

$$\underbrace{9,000}_{\text{Leo's own bid}} - \underbrace{4,500}_{\text{Pay Tim}} - \underbrace{3,500}_{\text{Pay Leo}} = 1,000$$

?(4.2) Car Trouble Envy Example 2

	Tim	Shawn	Leo
Bids on Car:	\$13,500	\$12,000	\$9,000

Shawn wins the car, and he decides to **pay Tim \$4,500 and Leo \$3,500.**

How much does Tim think Shawn got?

A) $-8{,}000$
B) 4,000
C) 5,500
D) 13,500
E) 18,000
F) 20,000

Car Trouble Envy Example 2

	Tim	Shawn	Leo
Bids on Car:	\$13,500	\$12,000	\$9,000

Shawn wins the car, and he decides to **pay Tim \$4,500 and Leo \$3,500**.

- Tim values the car more than Shawn does, so he thinks Shawn got

$$\underbrace{13,500}_{\text{Tim's own bid}} - \underbrace{4,500}_{\text{Pay Tim}} - \underbrace{3,500}_{\text{Pay Leo}} = 5,500$$

Car Trouble Envy Example 3

	Tim	Shawn	Leo
Bids on Car:	\$13,500	\$12,000	\$9,000

Shawn wins the car, and he decides to **pay Tim \$4,500 and Leo \$3,500**.

$$x_{Leo} = \underbrace{0}_{\text{No Item}} + \underbrace{3{,}500}_{\text{From Shawn}} = 3{,}500$$

Car Trouble Envy Example 3

	Tim	Shawn	Leo
Bids on Car:	\$13,500	\$12,000	\$9,000

Shawn wins the car, and he decides to **pay Tim \$4,500 and Leo \$3,500**.

$$x_{Leo} = \underbrace{0}_{\text{No Item}} + \underbrace{3,500}_{\text{From Shawn}} = 3,500$$

Leo computes his own compensation:

$$\underbrace{0}_{\text{No Item}} + \underbrace{3,500}_{\text{From Shawn}} = 3,500$$

Car Trouble Envy Example 3

	Tim	Shawn	Leo
Bids on Car:	\$13,500	\$12,000	\$9,000

Shawn wins the car, and he decides to **pay Tim \$4,500 and Leo \$3,500**.

$$x_{Leo} = \underbrace{0}_{\text{No Item}} + \underbrace{3,500}_{\text{From Shawn}} = 3,500$$

Leo computes his own compensation:

$$\underbrace{0}_{\text{No Item}} + \underbrace{3,500}_{\text{From Shawn}} = 3,500$$

Tim or Shawn compute Leo's compensation:

$$\underbrace{0}_{\text{No Item}} + \underbrace{3,500}_{\text{From Shawn}} = 3,500$$

$$x_{Leo} = \underbrace{0}_{\text{No Item}} + \underbrace{3,500}_{\text{From Shawn}} = 3,500$$

Leo computes his own compensation:

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Tim or Shawn compute Leo's compensation:

$$\underbrace{0}_{\text{No Item}} + \underbrace{3,500}_{\text{From Shawn}} = 3,500$$

All three get the same answer as we did (x_{Leo}) because Leo has no item whose value is not agreed upon.

?(4.3) Car Trouble Envy Example 4

	Tim	Shawn	Leo
Bids on Car:	$13,500	$12,000	$9,000

Shawn wins the car, and he decides to **pay Tim $4,500 and Leo $3,500.**

How much do all three think Tim got as his compensation?

A) 13,500
B) 3,500
C) 8,000
D) 18,000
E) 4,500
F) They do not agree on Tim's compensation

Car Trouble Envy Example 4

	Tim	Shawn	Leo
Bids on Car:	\$13,500	\$12,000	\$9,000

Shawn wins the car, and he decides to **pay Tim \$4,500 and Leo \$3,500.**

- All three men think Tim, who did not get the car, gets his actual compensation: the payment from Shawn

$$x_{Tim} = \underbrace{0}_{\text{No Item}} + \underbrace{4,500}_{\text{From Shawn}} = 4,500$$

Car Trouble Envy Analysis

- All three men think Tim, who did not get the car, gets his actual compensation: the payment from Shawn

$$x_{Tim} = \underbrace{0}_{\text{No Item}} + \underbrace{4,500}_{\text{From Shawn}} = 4,500$$

  Tim thinks he got 4,500, but he thinks Shawn's compensation is 5,500 (more than the actual amount $x_{Shawn} = 4,000$).

Tim **envies** Shawn: he thinks Shawn's compensation is higher than his own.

Car Trouble Perception (Viewing the Winner)

- Shawn thinks he got his compensation x_{Shawn}. He uses his bid, which is the winning bid:

$$x_{Shawn} = \underbrace{12,000}_{\text{Shawn's winning bid}} - \underbrace{4,500}_{\text{Pay Tim}} - \underbrace{3,500}_{\text{Pay Leo}} = 4,000$$

- Leo values the car less than Shawn does, so he thinks Shawn got

$$\underbrace{9,000}_{\text{Leo's bid}} - \underbrace{4,500}_{\text{Pay Tim}} - \underbrace{3,500}_{\text{Pay Leo}} = 1,000$$

- Tim values the car more than Shawn does, so he thinks Shawn got

$$\underbrace{13,500}_{\text{Tim's bid}} - \underbrace{4,500}_{\text{Pay Tim}} - \underbrace{3,500}_{\text{Pay Leo}} = 5,500$$

Car Trouble Perception (Viewing Losers)

- All three men see Leo, who did not get the car, as getting just his compensation (payment from Shawn)

$$x_{Leo} = 3,500$$

- All three men see Tim, who did not get the car, as getting just his compensation (payment from Shawn)

$$x_{Tim} = 4,500$$

- The next slides summarize these in a table called the perception chart and points out envy among the three guys.

Car Trouble Perception Chart

Person at left of row views Person at top of column as getting_____

	Tim	Shawn	Leo
Tim	**4,500**	**5,500**	3,500
Shawn	4,500	4,000	3,500
Leo	4,500	1,000	3,500

- **Tim** envies **Shawn**: Tim thinks Shawn got **$5,500** versus his own compensation of **$4,500.**
- Notice that Tim made the highest bid, but lost to Shawn.

Car Trouble Perception Chart

Person at left of row views Person at top of column as getting_____

	Tim	Shawn	Leo
Tim	4,500	5,500	3,500
Shawn	**4,500**	**4,000**	3,500
Leo	4,500	1,000	3,500

- **Shawn** envies **Tim**: Shawn thinks Tim got **$4,500** versus his own compensation of **$4,000.**
- Really, Tim and Shawn envy each other! They both think the other got a higher compensation. Notice that Tim made the highest bid, but lost to Shawn.

Car Trouble Perception Chart

Person at left of row views Person at top of column as getting_____

	Tim	Shawn	Leo
Tim	4,500	5,500	3,500
Shawn	4,500	4,000	3,500
Leo	**4,500**	1,000	**3,500**

- **Leo** envies **Tim**: Leo thinks Tim got **$4,500** versus his own compensation of **$3,500**.
- Notice that Shawn did not pay Tim and Leo the same amount.

Adjusted Winner Main Idea

Two people are given 100 points to spend on their bids.
At first, the **highest bidder** on each item wins that item.
Then, items are given to the other person or shared so that both people get **the same number of points from items won.**

Adjusted Winner Procedure Step 1

1) Each person **makes their bids:**

	Alice	Bob	Point Ratio
Ring	45	40	
Desk	21	20	
TV	5	20	
Sofa	29	20	
Points Spent on Won Items			

Adjusted Winner Procedure Step 2

2) The **highest bidder** on each item wins that item. Add up the points each person **spent on the items they won:**

	Alice	Bob	Point Ratio
Ring	**45**	40	
Desk	**21**	20	
TV	5	**20**	
Sofa	**29**	20	
Points Spent on Won Items	**95**	**20**	

- Alice spent $45 + 21 + 29 = 95$
- Bob spent $20 = 20$

	Alice	Bob	Point Ratio
Ring	**45**	40	
Desk	**21**	20	
TV	5	**20**	
Sofa	**29**	20	
Points Spent on Won Items	**95**	**20**	

- Alice spent $45 + 21 + 29 = 95$
- Bob spent $20 = 20$

Point Ratio

The **point ratio** for each item is

$$\frac{\text{Points bid by Winner of Item}}{\text{Points bid by Loser of Item}}$$

If this is near 1, then the winner and loser bid about the same on the item.

Next time

- Adjusted Winner Method