Method of sealed bids and of markers.

Method where the asset cannot be divided (example: House, car)

For this method, you need cash and the asset is already divided.

<u>Step 1</u> $P_1, \dots P_N$ $s_1 \dots s_n$ assets.

Each player bids for each asset $s_1, \dots, s_k$.

<u>Step 2</u> We allocate each item for the highest bidder. (if reverse the lowest bidder).

<u>Step 3</u> Compute the fair share value for each player

$$f_i = \frac{\text{Total value of his bids}}{\text{Number of players}} \quad \text{for player } P_i$$

<u>Step 4</u> If what the player receives is more than his fair share, he gives money <u>to the estate</u>.

Otherwise, he receives the difference

Step 5 Compute the surplus.

surplus = amount of money received by estate
— " " given

We divide the surplus among the players.

(We can do a reverse auction too).

Example (3.5 Ex 43) bidding list

	A	B	C
s_1	150	300	275
s_2	180	150	165
s_3	170	200	260
s_4	400	250	500
total	900	900	1200

B → s_1

A → s_2

C → $s_3 \vee s_4$

	A	B	C
fair value	300	300	400
Value obtained	180	300	760
to (from estate)	(120)	0	360

Surplus 240
↓
80 per player

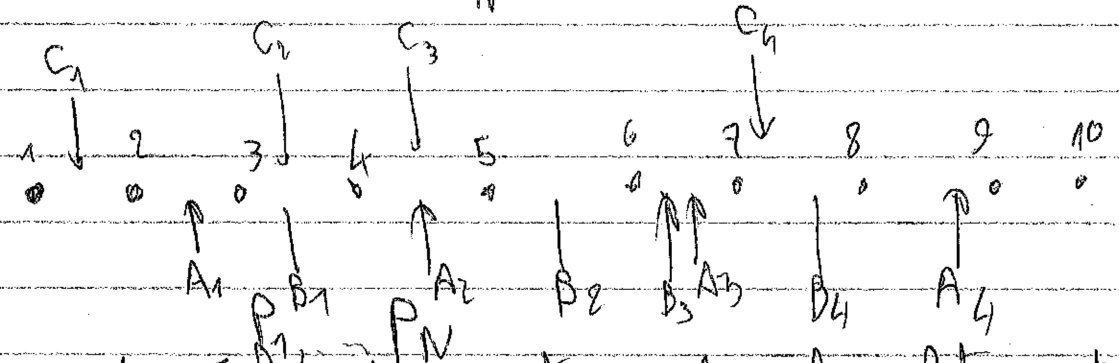
A : $s_2 + 120 + 80 = s_2 + 200$\$

B : $s_1 + 80$\$

C : $s_3 + s_4$ pays 280

Method of markers

Idea put the different asset in line.



Step 1 Each player puts N-1 markers between two consecutive assets

Step 2 sweep from left to right and look for the first marker

Anything on its left goes to the corresponding player.

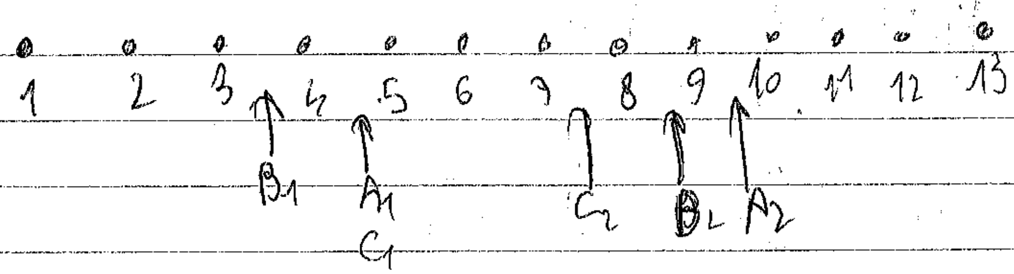
Remove that player's markers

Step 3 Look for any second marker after that

The corresponding player gets the corresponding segment

continue.

Step 4 Divide the surplus.



B_1 : 1 2 3

C_1 : 5 6 7

A : 10 11 12 13

Surplus : $\{4, 8, 9\}$.

Week 3 II 1/

Lone chooser method and the method of sealed bids.

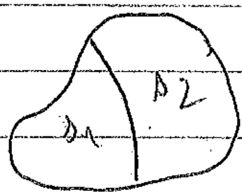
Lone chooser method (3 person)

Idea: everyone is dividing.

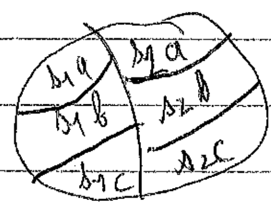
Step 0 two dividers D_1, D_2
one choose C

Step 1 D_1 and D_2 divide S (using the divider chooser method

$\rightarrow (s_1, s_2)$



Step 2 D_1 and D_2 divide their share in 3 parts



Step 3 the chooser chooses 1 of the s_1a s_1b s_1c
and 1 of the s_2a s_2b s_2c

Explanation D_1 gets $\frac{1}{2} \times \frac{2}{3} = \frac{1}{3}$

Say ~~sids~~ for C	s_1a	s_1b	s_1c	s_2a	s_2b	s_2c
	α	β	γ	α'	β'	γ'

$\alpha \leq \beta \leq \gamma$

$\alpha' \leq \beta' \leq \gamma'$

C chooses $(\cancel{\gamma + \gamma'})$. $(s_1 c \text{ and } s_2 c)$, with value $\gamma + \gamma'$

Is it more than 1/3 for him.

$$\alpha + \beta + \gamma + \alpha' + \beta' + \gamma' = 100\%$$

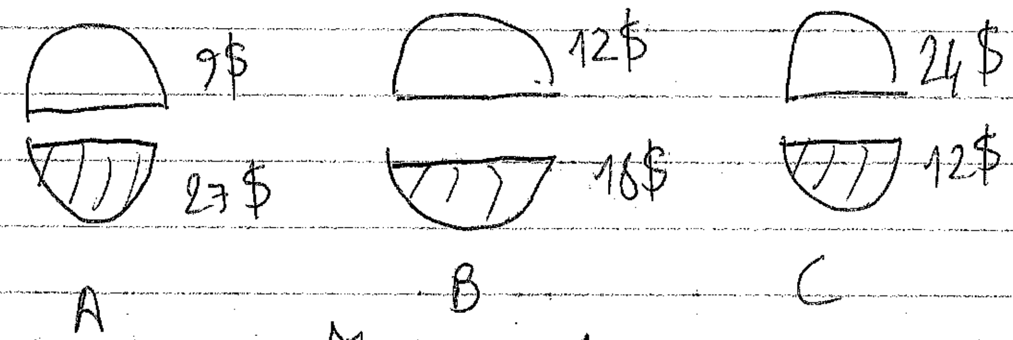
$$(\alpha + \alpha') + (\beta + \beta') + (\gamma' + \gamma) = 100\%$$

$$(\alpha + \alpha') \leq (\beta + \beta') \leq (\gamma' + \gamma')$$

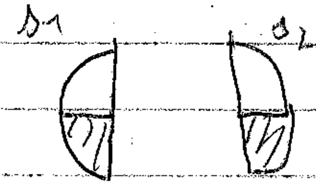
$$3(\gamma + \gamma') \geq$$

$$(\gamma + \gamma') + \underbrace{(\gamma + \gamma')}_{\geq (\alpha + \alpha')} + \underbrace{(\gamma + \gamma')}_{\geq (\beta + \beta')} \geq (\gamma + \gamma') + (\alpha + \alpha') + (\beta + \beta') = 100\%$$

Example



A, B divide



For A: s_1 4,5$ → 18$.

13,5$

For B. → 6$. s_1 → 15$.

→ 9$

Divide: s_{1a} 4,5$.

\+ 10° 1,5$

$\frac{90}{13,5} \times 1,5 = 10$

90° → 13,5$

? → 1,5$

s_{1b} 40° 6$

s_{1c} 40° → 6$

6\$

9\$.

$90^\circ \longrightarrow 6\$$

$\frac{90}{6} \times 5 \longrightarrow 5\$$

$s_2 a$ 75°

$s_2 b$ $15^\circ \to 1\$$.

$90^\circ \longrightarrow 9\$$

$40^\circ \to 4\$$.

$s_2 c$ $50^\circ \to 5\$$.

Now C prefers white part more than shaded.

C chooses $s_2 a$ and $s_{1,a}$.

A values he received $6\$ + 6\$ = 12\$$.

B values he received $10\$$.

C values: $\frac{5}{6} \times 12 + 12 + \frac{6}{9}$

75° 10°

C values: $22,66\$$