WORKSHEET ON ENVY-FREE PROTOCOLS

PROBLEM ONE-FIRST PLAYER HAPPY for FIVE PLAYERS

Give a protocol with five people A, B, C, D, E and a pie P such that

1) All but T of the pie is allocated.

2) 1st player gets $\geq X$ (YOU FILL THE X IN) so thinks $T \leq 1 - X$.

3) The allocation is envy-free.

4) We do not know what B, C, D, E think of T.

PROBLEM TWO-FIRST PLAYER HAPPY FOR SIX PLAYERS, MORE

1) Do the last problem for SIX players. Note how X changes.

2) Do the last problem for n players. What is X as a function of n?

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PROBLEM THREE-ALL PLAYERS HAPPY

Give a protocol with five people A, B, C, D, E and a pie P such that

1) All but T of the pie is allocated.

2) A, B, C, D all get $\geq X$ (YOU FILL IN THE X).

3) The allocation is envy-free.

PROBLEM FOUR- ALL BUT ϵ ENVY FREE

Let $\epsilon > 0$.

Give a protocol All-but-ϵ Envy-Free where:

1) All but S of the pie is allocated.

2) The allocation is Envy-Free

3) All of the players think $S \leq \epsilon$.