HW 6 HONR 209M. Morally DUE Tuesday Oct 15

1. (0 points) What is your name? Write it clearly. Staple your HW. When is the first midterm? When is the final?

2. (60 points)

   Alice's valuation is uniform on $[0, 1]$

   Bob's valuation is uniform on $[1/3, 2/3]$

   Carol's valuation is uniform on $[1/4, 7/8]$.

   (a) Write down all the needed equations and inequalities for a Linear program whose solution is a proportional division which maximizes total happiness. Say what each variable stands for and what each equation is enforcing. (NOT required to solve, but you can using an LP solver.)

   (b) Write down all the needed equations and inequalities for a Linear program whose solution is a proportional division which minimizes individual unhappines Say what each variable stands for and what each equation is enforcing. (NOT required to solve, but you can using an LP solver.)

   (c) Write down all the needed equations and inequalities for a Linear program whose solution is an envy free division which maximizes total happiness. Say what each variable stands for and what each equation is enforcing. (NOT required to solve, but you can using an LP solver.)

   (d) Assume that Alice KNOWS Carol's valuation. Write down AN equation that means Alice (using Alices valuation) gets more than Carol (using Carol's valuation).

3. (40 points)

   (a) Present a protocol that does 3-person proportional division with only 3 cuts (Hint: its really Divide and Conquer).

   (b) Find out EXACTLY how many cuts Divide and Conquer takes for $n = 4, 5, 6, 7, 8$ (Hint: Read the notes on Divide and Conquer. Gee— you should do that in any case.)