

Math 522 Exam 12: 4/18/13

Please read the exam instructions.

Please write your answers on **separate paper**, indicate clearly what work goes with which problem, and put your name on every sheet. Notes, calculators, and the textbook are all permitted. Cross out work you do not wish graded; incorrect work can lower your grade, even compared with no work at all. Keep this list of problems for your records. Show all necessary work in your solutions; if you are unsure, show it. You will earn between 25 and 50 points on each problem. You have 30 minutes.

You may earn extra credit by submitting revised answers to *both* of the following problems, by the next class day (4/23/13). Please see the syllabus for more details.

1. Let $n \in \mathbb{N}$. Suppose we have players P_1, P_2, \dots, P_n , with additive valuation functions f_1, f_2, \dots, f_n . Let B_1, B_2, \dots, B_n be bundles of goods and/or payments. Suppose that we assign bundle B_i to player P_i (for $1 \leq i \leq n$). Prove that if this assignment is envy-free then it is fair.
2. Suppose players A, B, C go in together on a fruit basket costing \$7.50. They want to divide the three fruits therein so that each gets one fruit. Use the HRS algorithm to find an envy-free assignment, dividing any surplus evenly. Their valuations are as follows.

	A	B	C
apple	2.00	3.50	2.50
pear	2.00	4.00	4.00
grapes	4.00	5.50	6.00