## The Basics of Sharing and the Divider Chooser Method MA 111 Homework due in class Friday April 13, 2012

Read Chapters 3.1 - 3.3 before coming to class on Friday, April 13. Have this worksheet completed and ready to grade at the beginning of class on Friday.

**Example 1:** Grandma Flo's will stipulates that her three grandsons, Moe, Joe, and Bo, are to divide the following three items in her estate: a car, a grand piano, and a jet ski. Joe thinks the car is worth 40% of the value of the whole estate, and the jet ski is worth 30%. The remaining values are in the table

	$\operatorname{car}$	jet ski	piano
Joe	40%	30%	
Moe	60%	5%	
Bo		40%	30%

- (a) Fill in the missing values
- (b) Which of the items are fair to Joe?
- (c) Which of the items are fair to Moe?
- (d) Which of the items are fair to Bo?
- (e) Can these three items be distributed to the three grandsons in a way that each grandson receives at least one third of the value of the estate? If so, find such a distribution. If not, explain why.

## Example 2:

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Larry	\$1000	\$1200	\$900	\$700
Barry	\$500	\$2000	\$500	\$1500
Mary	\$1200	\$1100	\$1000	\$1100
Gary	\$700	\$250	\$250	\$500

- (a) Which items are fair, according to Larry?
- (b) Which items are fair, according to Barry?
- (c) Which items are fair, according to Mary?
- (d) Which items are fair, according to Gary?
- (e) Can these four items be distributed to these four people in a way that each person receives what they perceive to be a fair share? If so, find such a distribution. If not, explain why.

**Example 3:** Pam and Tam purchased a pizza for \$24. They each pitched in \$12. The pizza is half pepperoni and half pineapple. Pam prefers pepperoni to pineapple, and would be willing to pay \$18 for the pepperoni half and only \$6 for the pineapple half. Tam likes the two ingredients equally, and would be willing to pay \$12 for each half. Tam and Pam know nothing of each others likes and dislikes. Suppose Pam serves as the divider.

- (a) Explain why Pam should not simply divide the pizza into the pepperoni half and the pineapple half.
- (b) How will Pam divide the pizza?
- (c) Which piece will Tam choose?
- (d) How much does Tam think her piece is worth?

**Example 4:** Ralph and Alf bought a sandwich for \$6. They each pitched in \$3. The sandwich is 8 inches long, and half of the sandwich is cheese, the other half of the sandwich is ham. Alf likes cheese twice as much as he likes ham. Ralph is lactose intolerant and therefore refuses to eat the cheese portion of the sandwich. Alf and Ralph know nothing about each others likes and dislikes.

- (a) Suppose Ralph serves as the divider.
  - (i) How will Ralph divide the sandwich?
  - (ii) Which piece will Alf choose?
  - (iii) How much does Alf think his piece is worth?
  - (iv) Suppose Ralph knows Alf's likes and dislikes. Could this change the way that Ralph divides the pizza?
  - (v) Return to the division in part (i). Suppose Alf knows Ralph's likes and dislikes. Could this change the way that Alf chooses?
- (b) Repeat the above problem, but suppose Alf serves as the divider.
  - (i) How will Alf divide the sandwich?
  - (ii) Which piece will Ralph choose?
  - (iii) How much does Ralph think his piece is worth?
  - (iv) Suppose Alf knows Ralph's likes and dislikes. Could this change the way that Alf divides the pizza?
  - (v) Return to the division in part (i). Suppose Ralph knows Alf's likes and dislikes. Could this change the way that Ralph chooses?