

**MAT 118 Fall 2013, Sample Chapter 3 Exam, Fair Division,
Chapter 3 exam is on Monday, Oct. 7 , 2013**

- (1) Alice, Bob and Charlie divide a pizza as follows: Alice and Bob fairly divide the pizza between themselves and then each cut their shares into three equal value pieces (from their point of view). Charlie chooses one piece from each of them. This procedure is called:
- (a) the lone divider method
 - (b) the lone chooser method
 - (c) the method of sealed bids
 - (d) the marker method

The following table gives three players' evaluations of shares and is used in Problems (1)-(3).

	s_1	s_2	s_3
Henry	32%	31%	37%
Tom	34%	31%	35%
Fred	$33\frac{1}{3}\%$	$33\frac{1}{3}\%$	$33\frac{1}{3}\%$

- (2) Which of the following is a fair division?
- (a) Henry gets s_1 , Tom gets s_2 and Fred gets s_3
 - (b) Henry gets s_2 , Tom gets s_1 and Fred gets s_3
 - (c) Henry gets s_2 , Tom gets s_3 and Fred gets s_1
 - (d) Henry gets s_1 , Tom gets s_3 and Fred gets s_2
 - (e) Henry gets s_3 , Tom gets s_1 and Fred gets s_2
 - (f) none of these
- (3) For the table above, how many different fair ways are there to assign the three shares to the three players?
- (a) only one way
 - (b) two ways
 - (c) three ways
 - (d) four ways
 - (e) five ways
 - (f) none of these

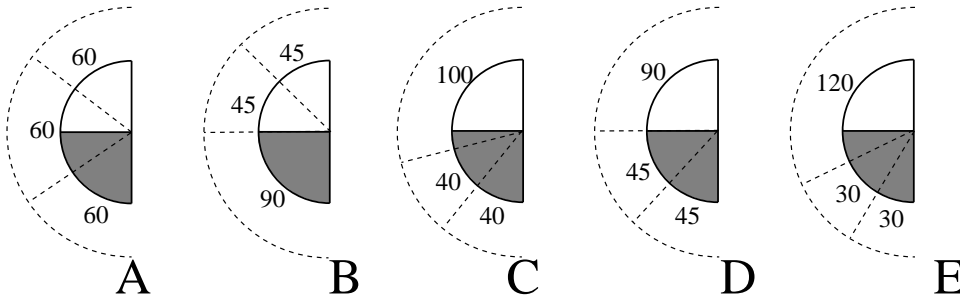
- (4) If the table above was formed by one of the players dividing the assets in the lone divider method, which player was the divider?
- (a) Henry
 (b) Tom
 (c) Fred
 (d) there is not enough information to decide this

The following situation is used in Problems (4)-(6).

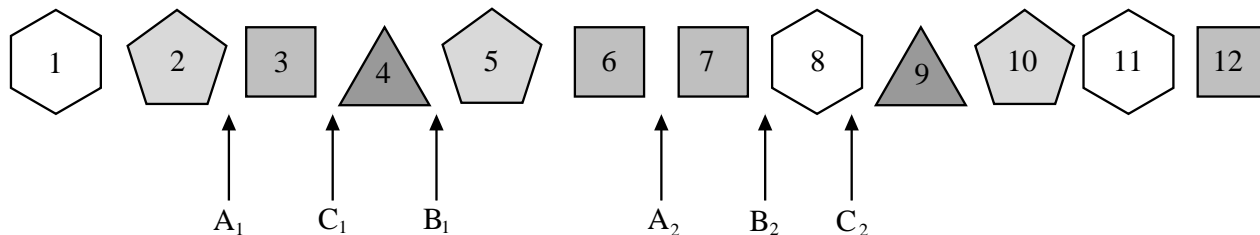
Angela, Boris and Carlos use the lone chooser method to divide a cheesecake that is half chocolate and half vanilla. Angela likes the chocolate twice as much as the vanilla, Boris likes the chocolate three times as much as vanilla and Carlos likes the vanilla and chocolate equally well. Carlos is the chooser. Angela and Boris divide the cake between them by each taking half the chocolate and half the vanilla. If the cheesecake cost \$24, then each of their pieces is worth \$12 to them.

- (5) How much is the vanilla part of her piece worth to Angela?
- (a) \$3
 (b) \$4
 (c) \$6
 (d) \$8
 (e) \$9
 (f) none of these

- (6) Which diagram below shows how Angela might divide her half-cake into three equal-value pieces? (white = vanilla, shaded = chocolate.)



- (7) After Carlos chooses his favorite pieces from Angela and Boris, Angela values her own share of the cake at
- (a) \$6 (b) \$8 (c) \$10 (d) \$12 (e) $12\frac{2}{3}$



- (8) Suppose Amy, Bob and Charlie are dividing 12 items using the method of markers and the markers are as shown above (with A,B,C, standing for Amy, Bob and Charlie, respectively). What items does Bob get in the initial distribution (before any leftovers are distributed)?
- (a) 1,2
 (b) 4,5,6
 (c) 5,6,7
 (d) 3,4,5,6
 (e) 9,10,11,12
 (f) 7,8,9,10,11

The following situation is used for Problems (8) - (9).

Oscar, Bert and Ernie use the method of sealed bids to divide four items they commonly own. The following table shows each player's bid for each item.

	Oscar	Bert	Ernie
Item 1	\$85	\$50	\$50
Item 2	\$35	\$50	\$45
Item 3	\$60	\$45	\$40
Item 4	\$30	\$35	\$30

- (9) What is the value of Oscar's fair share of the items?
- (a) \$45
 (b) \$50
 (c) \$55
 (d) \$60
 (e) \$65
 (f) \$70

- (10) What does Oscar get in the end?
- (a) no items and receives \$55 cash
 (b) no item and receives \$65 cash
 (c) Items 2 and 4 and pays \$10 cash
 (d) Items 2 and 3 and pays \$75 cash
 (e) Items 1 and 3 and pays \$60 cash
 (f) none of these