

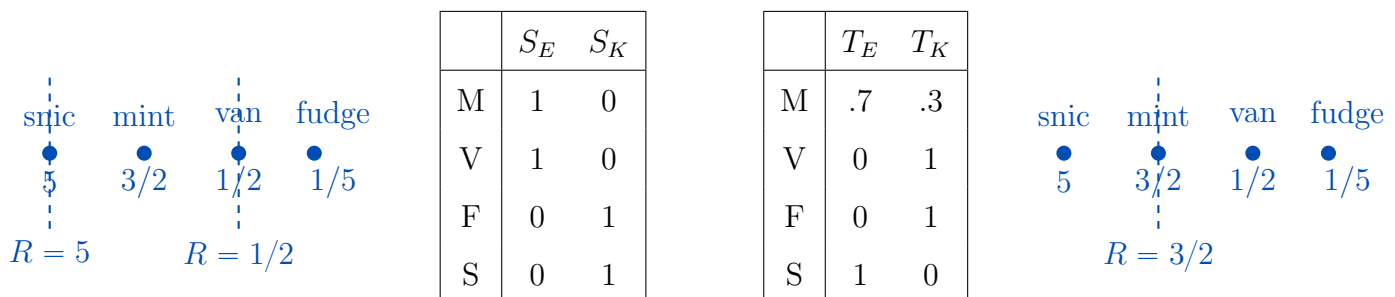
Quiz 17

1. Elena and Kaz are going to share a frozen hoagie. There are four components in the frozen hoagie - the ice cream flavors are mint chip and vanilla, the cookie flavors are fudge brownie and snickerdoodle. Elena (E) and Kaz (K) have the following values for the components:

	Mint	Van	Fudge	Snick
E	.3	.1	.1	.5
K	.2	.2	.5	.1
E to K val ratios	$3/2$	$1/2$	$1/5$	5

- (a) Compute the E to K valuation ratios and fill them out in the table above. (4 pts)
- (b) Circle which of the cuts below is a threshold division. Note that S_E goes to E and S_K goes to K , and same for T_E, T_K . In the space below right, you should draw and label the graph we discussed in class to justify your answer for partial credit. (3 pts)

The $S_E S_K$ -cut on the left is NOT a threshold division. The $T_E T_K$ -cut on the right is indeed a threshold division.



For the cut on the left (the $S_E S_K$ -cut): to have a threshold division, giving all the Snickerdoodle to Kaz would force everything to the right of a threshold line at $R \geq 5$ to be given to Kaz, but this is not the case! For example, Vanilla is given to Elena. By the same logic, giving Vanilla to Elena forces a threshold of $R \leq 1/2$, and that all of the Snickerdoodle and Mint Chip must be given to Elena. Since that did NOT happen in this $S_E S_K$ -cut, we conclude the cut is NOT a threshold cut.

For the cut on the right (the $T_E T_K$ -cut): Splitting the Mint Chip between E and K forces a threshold line to appear exactly at $R = 3/2$, passing over the Mint. Then everything to the right goes to Kaz: that's the Vanilla and Fudge Brownie. And everything on the left must go to Elena, which is just the Snickerdoodle. Since that is exactly what the $T_E T_K$ -cut does, we conclude that the cut is a threshold division.

2. Choose and prove ONE of the following claims: (3 pts)
- (a) A pareto-optimal, equitable division is fair.
- (b) Suppose there are $N = 4$ players dividing a cake. If a division is unfair to one player, then that player has envy.

(a) Ch 16 sols

(b) Ch 16 sols see day 2 (page 2)