

## Homework 17: Chapter 16

**Reading:** Chapter 16

**Book Exercises:** 16.1, 16.4, 16.6 (Solutions)

**Other Exercises:** (Solutions)

1. A family is sharing a homogenous spread of Motzah, Latkes, Hard boiled eggs, and Parsley for passover. Their values for the components are given in “ideal cake” table below:

	Motzah	Latkes	HB Eggs	Parsley
<i>A</i>	1/4	0	3/4	0
<i>B</i>	2/3	1/3	0	0
<i>C</i>	1/6	1/2	1/3	0
<i>D</i>	1/4	1/4	1/4	1/4

- (a) Is the equal division pareto-optimal in this example? Explain why or provide an objective improvement.
- (b) Consider a cut which gives all the HB Eggs to *A*, all the Latkes to *B*, all the Motzah to *C* and all the Parsley to *D*. Is this division pareto-optimal? Explain why or provide an objective improvement.
- (c) If *D* gets everything, is this Pareto-optimal? Explain why or provide an objective improvement.
2. Prove: for  $N = 5$  players, every envy-free division is fair. (Hint: show that if it is unfair to one player, then they have envy).