Chapter 11e homework solutions (2nd day)

1)

	choc	str
B	x	2x
J	2x	x
L	x	x

B gets $\frac{120(2x)}{180x + 180(2x)} = \frac{240x}{540x} = \frac{24}{54} = \frac{4}{9}$

J gets $\frac{120(2x)}{180(2x) + 180(x)} = \frac{240x}{270x} = \cdots = \frac{4}{9}$

L gets $\frac{60(x) + 60(x)}{180(x) + 180(x)} = \frac{120x}{360x} = \frac{1}{3}$

a) Yes it is fair, since each gets at least $1/3$.

b)

	B	J	L
B thinks	4/9	2/9	3/9
J	2/9	4/9	3/9
L	1/3	1/3	1/3

Yes, it is envy-free.

c) Yes it is Pareto-optimal. There is no possible objective improvement. You may have to try a few other divisions to convince yourself of this.

d) No, it is not equitable. Although B & J both get 4/9, L does not.

3) Consider the equal division first... everyone gets $1/N$.

Now consider any envy-free division. Since I think I got at least as much as anyone else either:

- I got $1/N$, and so did everyone else

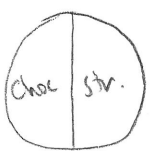
or

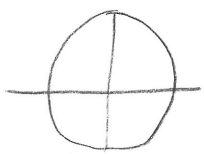
- I got $> 1/N$, and someone got $< 1/N$.

So it is fair to me. The same reasoning works for every player.

4)

	choc	str.
A	1	0
B	0	1



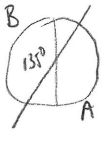


each player gets 90° of each flavor in the equal division. Each gets 1/2.

But  would be an objective improvement; each gets 1.

6)

	choc	str
A	1	0
B	0	1



each gets 1/4
equitable, not fair.