Discrete Chapter 2 Review

1) Uncle Joey, Uncle Jesse, Michelle, and D.J. are heirs to Stephanie's estate which consists of a teddy bear, a red wagon, a tricycle, and $800 in cash. They submit sealed bids as follows:

	Joey	**Jesse**	**Michelle**	**D.J.**
Teddy Bear	$100	$150	$125	$90
Wagon	$85	$75	$100	$90
Tricycle	$90	$65	$75	$85

a) What is each person's fair share?

Joey _____ Jesse _____

Michelle _____ D.J. _____

b) What items does each receive (if any)?

Joey _____ Jesse _____

Michelle _____ D.J. _____

c) How much cash is left after each person gets their fair share? _____

d) What is the FINAL settlement (total cash and items)?

Joey _____ Jesse _____

Michelle _____ D.J. _____

	Joey	Jesse	Michelle	D.J.
Fair Share				
item value				
difference				
cash for each				
final settlement				

2) The Teenage Mutant Ninja Turtles Fan Club is getting so large that in order to make decisions for the group, a council must be chosen to represent everyone. There are 15 seats on the council and each turtle must be represented fairly (according to the # of people in the group who support him).

Total population = _____ Ideal Ratio = _____

Turtle	*Class size (# of people who support him)*
Donatello	425
Raphael	375
Leonardo	225
Michelangelo	650

Turtle	*Quota*	*Truncated Quota*
Donatello		
Raphael		
Leonardo		
Michelangelo		

Now, we will decide how many seats each turtle will have representing him using the Hamilton, Jefferson, Webster, and Hill methods. First fill in the table with the adjusted ratios you will need.

Turtle	*Hamilton apportionment*	*Jefferson apportionment*	*Jefferson adjusted ratio*
Donatello			
Raphael			
Leonardo			
Michelangelo			

continued	*Webster apportionment*	*Arithmetic mean for turtle class*	*Hill Apportionment*	*Geometric mean for turtle class*
Donatello				
Raphael				
Leonardo				
Michelangelo				

Is there any particular method(s) one group would prefer to another?
If the Webster and Hill methods had apportioned 16 seats, who would have one taken away by the Webster method?
By the Hill method?
What if they had apportioned only 14 seats? Who would get the extra one by the Webster method?
By the Hill method?

3) Explain step-by-step how 3 people, Bart, Lisa, and Maggie could fairly divide a cake (or any other continuous item).

4) Explain the steps used in mathematical induction and what it proves. (You can use a specific example, such as the sum of the first n positive integers is $\frac{n(n+1)}{2}$.

BONUS #1 *****: Prove that the nth even integer is 2n.

BONUS #2 ******: Find a formula and a recurrence relation for the following pattern:
5, 7, 9, 11, 13 .....