

HW 5 HONR 209M. Morally DUE Tuesday Mar 9

Throughout this HW a *scenario* is saying what fraction a person assigns to a piece of cake. For example you can say: Alice assigns the first $1/2$ of the cake (Geometrically) the value $1/3$ and the next $1/4$ the value $1/6$, and the last $1/4$ the value $1/2$.

1. (10 points) What is your name? Write it clearly. Staple your HW. When is the first midterm? When is the final?

2. (45 points) Let (a) $S_1 = \sum_{i=1}^n i$, (b) $S_2 = \sum_{i=1}^n i^2$, and (c) $S_3 = \sum_{i=1}^n i^3$. Using the fact that

$$(i + 1)^4 = i^4 + 4i^3 + 6i^2 + 4i + 1$$

derive an expression for S_3 in terms of S_1 and S_2 .

3. (45 points) Consider the divide and Conquer protocol for four people A,B,C,D. We will have A,B,C make their cuts and then D chooses which side to split with one of them.

- (a) Give a scenario where A is envious of B. (Where they all play honestly.)
- (b) Give a scenario where A is envious of D. (Where they all play honestly.)
- (c) Give a scenario where A plays dishonestly and ends up with less than $1/4$.
- (d) Give a scenario where D plays dishonestly and ends up with less than $1/4$.