

## Assignment 18, due March 5

1. In the next class we'll look at MONEY-MAKING . Please read §14.3 from the handout.
2. Example 14.1 (page 276) shows that CBAL can perform exponentially better than BAH . Show the following:
  - (a) In some circumstances BAH can perform better than CBAL . Give an example market sequence  $X$ , and choices for BAH and CBAL where this happens. Let  $X$  be a fluctuating sequence, i.e., its values are strictly less than one at reasonable intervals.
  - (b) On the other hand, show that CBAL-OPT , the optimal offline constant rebalanced algorithm performs at least as well as BAH-OPT , the optimal offline buy and hold strategy.
3. Consider the sequence  $X = (x_1, x_2, \dots, x_k)^{n/k}$ , in which the relative prices repeat the same pattern every  $k$  steps. We are interested in the performance of CBAL  $(0.5, 0.5)$ .
  - (a) Determine the compounded return of CBAL  $(0.5, 0.5)$  on  $X$ .
  - (b) Does the compounded return depend on the order of the  $x_i$  values in the pattern, as long as the values remain the same? E.g., do you get a different return for  $(x_k, x_{k-1}, \dots, x_1)^{n/k}$ ?
  - (c) Is there a value for  $\max_i x_i$  such that irrespective of the other values of  $x_i$ s, the compounded return is strictly larger than  $2^{n/k}$ ?
  - (d) For CSE 60317 only: Is it true that if

$$\prod_{i=1}^k x_i = 1, \text{ and } \max_i x_i > 1,$$

the compounded return is strictly larger than 1?