Assignment 8, due Feb 5

1. We will finish the proof for BIT in the next class. Please read §2.3 which shows that a very similar algorithm to BIT, called RMTF, is not $(2-\varepsilon)$-competitive for any given $\varepsilon > 0$. This is indeed surprising, and demonstrates the subtle nature of randomized algorithms. The proof in the section may seem a tad "under-explained". Also, I believe the expected cost of RTMF to serve σ is at least $2\ell^2 + \ell k - 2\ell$ instead of $2\ell^2 + 2\ell k - 2\ell$. Why is it that although it shows that the cost ratio of RMTF and MFT is at least $2 - \varepsilon$ with high probability, and we already have a lower bound of $2 - 2/(l+1)$ for competitive ratio of MTF, we can only say that the competitive ratio of RMTF is lower bounded by $2 - \varepsilon$ and not the product $(2 - \varepsilon)(2 - 2/(l+1)) \simeq 4$?

2. For CSE 40317: Exercise 2.1 on page 26. [Hint: We don't need to go into the details of the proof for Theorem 2.1. Instead we generate an initial input sequence such that the effects of the randomization are "neutralized." Next we append an input sequence for which MTF costs about half as much as the modified BIT. Show that $\sigma = (x_l, x_l, x_{l-1}, x_{l-1}, \ldots, x_1, x_1)^k$ for sufficiently large k accomplishes the above.]

3. For CSE 60317: Please read, in addition, §2.4 and §2.5. The latter introduces an amazing algorithm, COMB, which is the best known randomized algorithm for list accessing. We will not be covering these sections in class.