

## Homework 3

Due at the *beginning* of class on Oct. 17

I suggest to use  $\text{\LaTeX}$  when typing up your solutions.

1. Assume  $s(n), t(n) \geq n$  are space/time-constructible.
  - (a) Prove that  $\text{NSPACE}(s(n)) \subseteq \text{ATIME}(s(n)^2)$ .
  - (b) Prove that  $\text{ATIME}(t(n)) \subseteq \text{SPACE}(t(n))$ .
  - (c) Prove that  $\text{ASPACE}(s(n)) \subseteq \text{TIME}(2^{O(s(n))})$ .
  - (d) **(Extra credit)** Prove that  $\text{TIME}(t(n)) \subseteq \text{ASPACE}(\log t(n))$ .
2. Prove that the two definitions of  $\mathcal{P}_{/\text{poly}}$  given in class are equivalent.
3. Arora-Barak, Exercise 6.3.
4. Exercise 6.9.