Assignment # 2
(Due October 28)

1. 3-Makespan. Develop an FPTAS for the 3-MACHINE MAKESPAN problem: given $n$ jobs with processing times $t_1, \ldots, t_n$, schedule the jobs on 3 identical machines so that the makespan is minimized.

2. Planar Vertex-Cover. The problem PLANAR VERTEX COVER is to find a smallest set $S$ of vertices in a given planar graph $G$ such that every edge in $G$ has at least one end in $S$. The problem is NP-hard. Develop a PTAS for the problem. You can use Lipton-Tarjan’s Planar Graph Separator Theorem. Also, you can assume that a minimum vertex cover of a graph of $n$ vertices contains at least $n/2$ vertices (this condition can be achieved via a non-trivial polynomial time preprocessing).

3. Improving Graham. The MAKESPAN problem is to schedule $n$ given jobs of processing times $t_1, \ldots, t_n$ on $m$ machines (where $m$ is part of the input) so that the makespan is minimized. Graham’s algorithm for the MAKESPAN problem has an approximation ratio 2. Modify Graham’s algorithm to improve the approximation ratio to be bounded by 1.5.