Ampliació d'Algorismia **QP 2016-2017**

Entrega puntuable

Fecha de entrega **01-06-2017**

El objetivo es preparar un pequeño dosier (maximo 6 páginas sin incluir referencias) para el problema asignado conteniendo:

- Un ejemplo de instancia.
- La formulación de un problema decisional derivado de la definicion.
- La formulación de al menos un problema parametrizado derivado de la definición.
- Un pequeño dosier sobre resultados publicados sobre complejidad y aproximabilidad del problema, parametros y complejidad parametrizada.
- Las ideas fundamentales de al menos un resultado (algoritmo o reducción) relacionado con aproximabilidad o con parametrizacion para vuestro problema.

La entrega será vía raco antes de las **23:59 del día 01-06-2017**.

Aqui teneis una lista de problemas. La asignacion a grupos la encontrareis en otro archivo.

1. MINIMUM MULTICUT PROBLEM
Given a graph and a set y of pairs of terminal vertices, the multicut problem asks for the minimum number of vertices to remove so that all the pairs of terminal vertices in Y are separated.

2. MINIMUM SEQUENCING WITH RELEASE TIMES
Set T of tasks, for each task $t \in T$ a release time, a length, and a weight . We look for a one-processor schedule for T that obeys the release times, i.e. a function $f : T \rightarrow N$ such that, for all $u \geq 0$, if $S(u)$ is the set of tasks t for which $f(t) \leq u \leq f(t) + l(t)$, then $|S(u)| = 1$ and for each task t, $f(t) \geq r(t)$. We one to compute one for which the weighted sum of completion times, i.e.
$$\sum_{t \in T} w(t)(f(t) + l(t)).$$

3. MINIMUM MULTIPROCESSOR SCHEDULING
Set T of tasks, number m of processors, length $l(t, i) \in Z^+$ for each task $t \in T$ and processor $i \in \{1, \ldots, m\}$. We look for an m-processor schedule for T, i.e., a function $f : T \rightarrow \{1, \ldots, m\}$ with minimum finish time for the schedule, i.e., minimum
$$\max_{i \in \{1,\ldots,m\}} \sum_{t \in T} l(t, f(t)).$$

4. MAXIMUM NOT-ALL-EQUAL 3-SATISFIABILITY
Given a set U of variables, a collection C of disjunctive clauses of at most 3 literals, where a literal is a variable or a negated variable in U find truth assignment for U so that the subset of the clauses that has at least one true literal and at least one false literal has maximum cardinality.

5. MAXIMUM BIPARTITE COLORFUL NEIGHBORHOOD
Given a bipartite graph $G = (V_0, V_1, E)$; a positive integer k. compute a two-coloring of V_1 that maximices the number of vertices in V_0 that have a colorful neighborhood, i.e has at least one neighbor of each color.

6. MINIMUM CLUSTER EDITING
Instance: A graph G = (V, E); a positive integer k. Question: Given a graph $G = (V, E)$ obtain a list with the minimum number of transformations, edge deletion or addition, to transform G into a graph that consists of a disjoint union of cliques.

7. MAXIMUM VERTEX DISJOINTS PATHS
Given a graph $G = (V, E)$, $s_1, \ldots, s_k$ start vertices; $t_1, \ldots t_k$ end vertices. find a maximum number of vertex disjoint paths, such that if a path starts at vertex s_i it must end at vertex t_i.

8. MINIMUM EDGE COLORING
Given a graph $G = (V, E)$, a k-cooloring of E is an assignment of colors to the edges so that no two incident edges have the same color. Compute aan edge coloring with the minimum possible number of colors.

9. MINIMUM FEEDBACK VERTEX SET
A feedback vertex set of a directed graph G is a subset of vertices V' such that V' contains at least one vertex from every directed cycle in G. Given a digraph $G = (V, E)$ compute a feedback vertex set of minimum cardinality.

10. MAXIMUM PLANAR SUBGRAPH
Given a graph $G = (V, E)$ compute a planar subgraph $G' = (V, E')$ with maximum number of edges.

11. MINIMUM CUT LINEAR ARRANGEMENT
Given a graph $G = (V, E)$, compute a one-to-one function $f : V \to [1..|V|]$. so that the maximum number of cut edges in any integer point, i.e.

$$\max_{i \in [1..|V|} |\{\{u, v\} \in E : f(u) \leq i < f(v)\}|.$$

12. MINIMUM LEAF SPANNING TREE
Given a graph $G = (V, E)$ compute a spanning tree T such that the number of leaves in the spanning tree is maximum.

    Given a digraph $G = (V, E)$ compute a partition of V into disjoint sets V_1 and V_2 such that the number of arcs starting in V_1 and ending in V_2 is maximum.

13. MINIMUM BICONNECTIVITY AUGMENTATION
Given a directed graph $G = (V, E)$ and a symmetric weight function $w : V \times V \to N$ find a connectivity augmenting set $E' \subseteq E$ of minimum weight. A' is a connectivity augmenting set if the digraph $G' = (V, E \cup E')$ is strongly connected.