PONTIFICIA UNIVERSIDAD CATÓLICA DEL PERÚ
FACULTAD DE CIENCIAS E INGENIERÍA

ALGORITMIA
Examen 1
(Segundo semestre 2014)

Indicaciones generales:

- Duración: 2h 50 min.
- Materiales o equipos a utilizar: No se permite el uso de material de consulta.
- Al inicio de cada programa, el alumno deberá incluir, a modo de comentario, la estrategia que utilizará para resolver el problema. De no incluirse dicho comentario o si la implementación es significativamente diferente a la estrategia indicada, el alumno perderá el derecho a reclamo en esa pregunta.
- Un programa que no muestre resultados coherentes y/o útiles será corregido sobre el 60 % del puntaje asignado a dicha pregunta.
- **Debe utilizar comentarios para explicar la lógica seguida en el programa elaborado.**
- Cada programa debe ser guardado en un archivo con el nombre *preg#_<codigo_de_alumno>.c* y subido a PAIDEIA en el espacio indicado por los Jefes de Práctica.

Puntaje total: 20 puntos

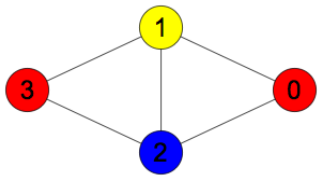
Cuestionario:

Pregunta 1 (5 puntos) Sorting

Indique el nombre o número de equipo en el que realizó el primer trabajo grupal.

Pregunta 2 (7 puntos) M Coloring

Given an undirected graph and an integer m, determine a color configuration such that, using at most m colors, no two adjacent vertices are colored with the same color. For example, for $m = 3$, the following graph can be colored successfully (each node has a number that indicates that it is the i-th node of the graph):



Assuming that each color is represented by a number (Red = 0, Yellow = 1, Blue = 2), the color configuration for this graph is 0 1 2 0 (the i-th element is the color assigned to the i-th node).

The process must assign one color to each node, starting with node 0, then node 1, then node 2, etc. Each assignment must try to use the color represented by the lowest possible number.

The first line of the input will contain m (the maximum number of colors that can be used). The second line will contain the number of nodes in the graph and the following lines contain the connections in the graph as pairs i j that represent a connection between node i and j. The line -1 -1 means that all connections of the graph have been read. The output must be a color configuration as given for the previous graph. If no color configuration exists, the output must be X.

Sample Input:	Sample Output:
3 4 3 2 0 1 1 2 0 2 1 3 -1 -1 2 3 0 1 1 2 2 0 -1 -1	0 1 2 0 X

Pregunta 3 (8 points) Word Wrap

Word wrap is the feature of most text editors, word processors, and web browsers that breaks lines between and not within words, which generates additional spaces. The sum of squares of the number of spaces is used to measure how much space is wasted. Use dynamic programming to minimize this.

For example, assume we want to wrap the string *aaa bb cc ddddd* to a line width of 6 characters.

Line width: 6 - Greedy Solution		Dynamic Programming Solution	
aaa bb	Remaining space: 0	aaa	Remaining space: 3
cc	Remaining space: 4	bb cc	Remaining space: 1
ddddd	Remaining space: 1	ddddd	Remaining space: 1
cost $= 0^2 + 4^2 + 1^2 = 17$		cost $= 3^2 + 1^2 + 1^2 = 11$	

The first line of the input is n m, where n represents the number of words and m represents the line width. The next n lines: l w, where l (integer) represents the length of w (string).

Sample Input:	Sample Output:
6 12 2 We 4 love 8 computer 7 science 3 and 11 mathematics 6 10 8 Everyone 4 must 5 learn 3 how 2 to 4 code	We love computer science and mathematics Everyone must learn how to code

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