COMS 3101 - Fall 2013
Homework 4 (Extra)

- This part is optional.
- Due by start of class (Monday 4pm).
- See submission instructions.

1. Recall the "building a winning team" problem from class (lecture 4 slides). We will solve almost an identical problem which differs from BWT as follows:

   A. Instead of a single scouting report, you now have two of them {R1,R2}. R1 consists of K1 marks, and R2 of K2 marks for each player in the pool.

   B. You are also given two vectors {B1,B2} describing the total quality for each report respectively, instead of one (B).

   Obviously, the 'assumptions' and 'approach' described in class are almost the same for this "BWT2" problem.

   a) Formulate the problem BWT2 in mathematical notation. You can include a separate text file with your code, or just use block comments in the function below.
   b) Convert your notation from part (a) to solver form. Hint: you cannot just copy from the lecture slide, there is a difference.
   c) Write a function named "bwt2.m". Your function should have one input parameter 'specs', a struct with the fields {P,N,C,R1,R2,B1,B2}.
   d) Assume that there are no errors in the fields {P,N,C}. Add a check to ensure that the matrices/vectors supplied in fields {R1,R2,B1,B2} have the right size. The number of skills {K1,K2} can be any positive integer, but {R1,B1} should be consistent with each other (same goes for {R2,B2}).
   e) Your function should implement the conversion of the input parameters to solver form, and then make two calls to the solver:
      A. x1 = bintprog(f,A,b,Aeq,beq)
      B. x2 = bintprog(problem)

f) For call (B), make sure to read the browser documentation. You should be passing a struct ‘problem’ which has appropriate fields.
g) Check that the solutions you obtained {x1,x2} are identical.

NOTE: the problem is much easier if you first review the lecture slides carefully.
NOTE: it is not difficult to verify that your code is working by generating random data {C, R1,R2} specifying some small values of {P,N} and adjusting {B1,B2}.