Fantasy Sports

Fantasy sports is a multibillion-dollar industry that gathers players from around the world. The competition consists in selecting virtual or fantasy teams composed by players from a pool of games. The virtual teams are ranked according to the real score achieved by the players in the team. Contestants compete for money or other prizes usually via webpages like draftkings or fanduel.

Consider a fantasy football competition in which each contestant is allowed to participate with at most one fantasy team or entry. Each player has a salary that must be paid to get the player into the entry, a projected score that is an estimation of how many points will the player achieve, and a corresponding position:

- Quarterback (QB)
- Running Back (RB)
- Wide Receiver (WR)
- Tight End (TE)
- Defense (DST)

An entry consists of 6 players that satisfy the following conditions:

- The total combined salary of the selected players is at most 50,000
- There must be at least 1 player for each position
- The sixth player is a flexible player that can be either a RB, WR, or TE

Consider the set of players given in the file “PlayersData.xlxs”:

- Generate random salaries distributed uniformly between 5,000 and 14,000
- Generate random projected scores distributed uniformly between 1 and 25

1. Formulate the problem of selecting the entry with maximum projected score as a **linear** integer program. Clearly state your parameters, variables, constraints, and objective.

2. Solve the problem using Xpress-MP for the data set generated above. Report the optimal solution obtained and the objective function. Please include your code and data set in the submission.

3. Organize and present your results in a non-technical fashion.

Now consider that the contest allows inscribing 2 entries, both following the same rules stated above.

4. Select the first entry using the formulation from question 1.

a. Formulate the problem of selecting the **second** entry as a **linear** integer program. Enforce the condition that the second entry cannot be exactly the same as the first entry already selected.

b. Define some measure of diversity for your entries. Formulate the problem of selecting the **second** entry as a **linear** integer program enforcing the measure of diversity proposed.

c. Solve the problems using Xpress-MP for the data set generated above. Organize and present your results in a non-technical fashion.