1. **Integer Programming.**

The beginning of a new soccer season is around the corner. The head and assistant coach of a team, Flamingo FC, want to get maximum game time out of all players in the 6 pre-season practice games that they have organized in order to get their players back in shape and full fitness in readiness for the upcoming season. There are a total of 18 players on roster, including 3 players that are returning from injuries sustained over the last season. For ease of planning and monitoring, the coach has split these 18 players into 3 groups of 6 players each, and has also pre-planned the minutes of play for every player. The table below indicates the pre-planned minutes of play for 6 of the players, including the 3 injured players. The requirement around this group is that: either all players play, or all miss the same practice game. If the 3 injured players cannot play for more than 320 minutes in total across all of the 6 practice games (each match is of 90minutes duration), what is the maximum minutes of play that can be achieved out of this group of 6 players?

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| Practice Game | Player 1 (Injury) | Player 2 (Injury) | Player 3 (Injury) | Player 4 | Player5 | Player 6 |
| 1 | 45 | 77 | 63 | 75 | *81* | 85 |
| 2 | 81 | 45 | 70 | 68 | 88 | 90 |
| 3 | 45 | 78 | 81 | 82 | 90 | 90 |
| 4 | 81 | 87 | 90 | 90 | 90 | 90 |
| 5 | 90 | 90 | 88 | 90 | 77 | 60 |
| 6 | 90 | 81 | 45 | 70 | 90 | 88 |

**Discussion.**

This is an example of an integer programming model. The basic objective if fairly simple, i.e. to maximize the minutes of play for this group. We must decide which of the 6 matches will be played by this group of players that will help them get ready for the upcoming season. In this case, we only need to decide which matches to select, i.e. a binary decision. The minutes of play by each player cannot be controlled by us and have been predefined in the question. We need to be vary of the constraint that the players returning from injury cannot play for more than 320 minutes in total across the matches chosen.