

## CS 121 – Homework #9 – due Tuesday, April 30, 2019

### Hockey Plus/Minus Ratings

This assignment will give you more practice in Python including file I/O, tokenizing, strings, lists and dictionaries.

A common statistic for evaluating hockey players is called the plus/minus system. Players on the ice have the offensive responsibility to help their team score goals. At the same time, they have the defensive responsibility to prevent the opposing team from scoring. The plus/minus statistic aims to reward players who contribute (even indirectly) to their team scoring, and penalize players for letting the opposing team score. Plus/minus has no effect on the outcome of the game. It's only a statistic for evaluating the performance of individual players.

While on the ice, players earn +1 whenever their team scores a goal, and they earn -1 each time the opposing team scores. But there is an exception to this rule. Normally, there are 6 players on the ice from each team. Players who commit a penalty are taken out of the game temporarily (usually for 2 minutes). During this time, the offending player cannot be replaced, so the team is said to be "shorthanded" and the opposing team is said to have a "power play." If your team has a power play, then you are expected to capitalize on this opportunity and score a goal. Thus, power play goals do not contribute to any player's plus/minus rating. On the other hand, goals scored by a team that is equally matched or shorthanded do count for plus/minus.

Although the goalie is usually one of the 6 players on the ice, goalies are not evaluated according to plus/minus. They have their own statistics which we won't address in this program.

Your program will need to store information about individual hockey players. The attributes of a player will be the name, position, (jersey) number, and the plus/minus rating. You also need to keep track of the names of the two teams. In practice, you will probably find it convenient to maintain a dictionary of players for each team.

When your program starts, it should open an input file called hockey.txt. This file will summarize a single hockey game. The beginning of the file will mention which teams are playing. The visiting team is displayed first. The rest of the file will describe the "goal" events.

Each time there is a goal, you will see which team scored, what kind of goal it was, and which players on both teams were on the ice at the time of the goal. Again, the visiting team is listed first no matter which team just scored. Based on the goal information, your program should calculate the plus/minus ratings of all players on each team. There will be a blank line separating each goal. The first line of the goal will announce the goal like this "<name of team> scored goal!". This may be followed by "(Power Play)" or "(Shorthanded)" as appropriate. If there is no notation after the '!', then it is a goal when both teams had equal strength. Note that players do not earn plus/minus on a power play goal. When each player is listed, you will see three pieces of information: the player's position, name and jersey number. See the example input below for the precise format of the input.

Finally, print a list of players on each team, with the visiting team displayed first. Within a team, players should be sorted in descending order by the plus/minus rating. Your output should appear in neat justified columns, exactly as you see the example output below.

*Assumptions and Hints:*

- There will be at least 1 goal scored during the game.
- The possible player positions are "Center", "Right Wing", "Left Wing", "Defense", and "Goalie". This is the order in which players on a team are listed in the input file.
- As noted earlier, goalies do not earn plus/minus. Do not include goalies in your output.
- Your output should only list those players who actually received a plus/minus score. For example, a player who was only present during a power play goal should not appear in your output. Note that at the end of the game it is possible for a player's plus/minus rating to be zero. For example, this can be achieved by a +1 and a -1.

Here is an example input file.

PIT versus OTT

PIT scored goal! (Power Play)

On the ice for PIT:

Center - EVGENI MALKIN (71)  
Center - SIDNEY CROSBY (87)  
Right Wing - PETR SYKORA (17)  
Left Wing - RYAN MALONE (12)  
Defense - SERGEI GONCHAR (55)  
Goalie - MARC-ANDRE FLEURY (29)

On the ice for OTT:

Center - ANTOINE VERMETTE (20)  
Right Wing - SHEAN DONOVAN (10)  
Defense - CHRIS PHILLIPS (4)  
Defense - ANTON VOLCHENKOV (24)  
Goalie - MARTIN GERBER (29)

OTT scored goal!

On the ice for PIT:

Center - MAXIME TALBOT (25)  
Right Wing - GEORGES LARAQUE (27)  
Left Wing - RYAN MALONE (12)  
Defense - BROOKS ORPIK (44)  
Defense - SERGEI GONCHAR (55)  
Goalie - MARC-ANDRE FLEURY (29)

On the ice for OTT:

Center - ANTOINE VERMETTE (20)  
Left Wing - CORY STILLMAN (61)  
Left Wing - NICK FOLIGNO (71)  
Defense - WADE REDDEN (6)  
Defense - ANTON VOLCHENKOV (24)  
Goalie - MARTIN GERBER (29)

PIT scored goal!

On the ice for PIT:

Center - MAXIME TALBOT (25)  
Center - TYLER KENNEDY (48)

Left Wing - JARKKO RUUTU (37)  
Defense - RYAN WHITNEY (19)  
Defense - KRISTOPHER LETANG (58)  
Goalie - MARC-ANDRE FLEURY (29)  
On the ice for OTT:  
Center - JASON SPEZZA (19)  
Right Wing - DANIEL ALFREDSSON (11)  
Left Wing - DANY HEATLEY (15)  
Defense - WADE REDDEN (6)  
Defense - BRIAN LEE (55)  
Goalie - MARTIN GERBER (29)

PIT scored goal!  
On the ice for PIT:  
Center - SIDNEY CROSBY (87)  
Right Wing - MARIAN HOSSA (18)  
Left Wing - PASCAL DUPUIS (9)  
Defense - HAL GILL (2)  
Defense - KRISTOPHER LETANG (58)  
Goalie - MARC-ANDRE FLEURY (29)

On the ice for OTT:  
Center - JASON SPEZZA (19)  
Center - ANTOINE VERMETTE (20)  
Right Wing - DANIEL ALFREDSSON (11)  
Left Wing - DANY HEATLEY (15)  
Defense - WADE REDDEN (6)  
Defense - ANDREJ MESZAROS (14)

The corresponding output from your program should say:

Visiting team PIT

#58 KRISTOPHER LETANG	Defense	rating: 2
#48 TYLER KENNEDY	Center	rating: 1
#37 JARKKO RUUTU	Left Wing	rating: 1
#19 RYAN WHITNEY	Defense	rating: 1
#87 SIDNEY CROSBY	Center	rating: 1
#18 MARIAN HOSSA	Right Wing	rating: 1
# 9 PASCAL DUPUIS	Left Wing	rating: 1
# 2 HAL GILL	Defense	rating: 1
#25 MAXIME TALBOT	Center	rating: 0
#12 RYAN MALONE	Left Wing	rating: -1
#44 BROOKS ORPIK	Defense	rating: -1
#55 SERGEI GONCHAR	Defense	rating: -1
#27 GEORGES LARAQUE	Right Wing	rating: -1

Home team OTT

#61 CORY STILLMAN	Left Wing	rating: 1
#71 NICK FOLIGNO	Left Wing	rating: 1
#24 ANTON VOLCHENKOV	Defense	rating: 1
#20 ANTOINE VERMETTE	Center	rating: 0
# 6 WADE REDDEN	Defense	rating: -1
#55 BRIAN LEE	Defense	rating: -1
#14 ANDREJ MESZAROS	Defense	rating: -1
#15 DANY HEATLEY	Left Wing	rating: -2
#19 JASON SPEZZA	Center	rating: -2
#11 DANIEL ALFREDSSON	Right Wing	rating: -2