# 112A Introduction to Computer and Computer Science

# Final Project

## Due: 1/9 12:00:00

We have practiced how to calculate some advanced batting statistics such as the on-base plus slugging plus ($OPS^+$), the weighted on-base average (wOBA), and the weighted runs created (wRC) during our happy, enjoyable, and fulfilling class hour. Some of you might wonder, where is the pitcher? After all, a baseball game cannot play without a pitcher. So, in this final project, we are going to do more.

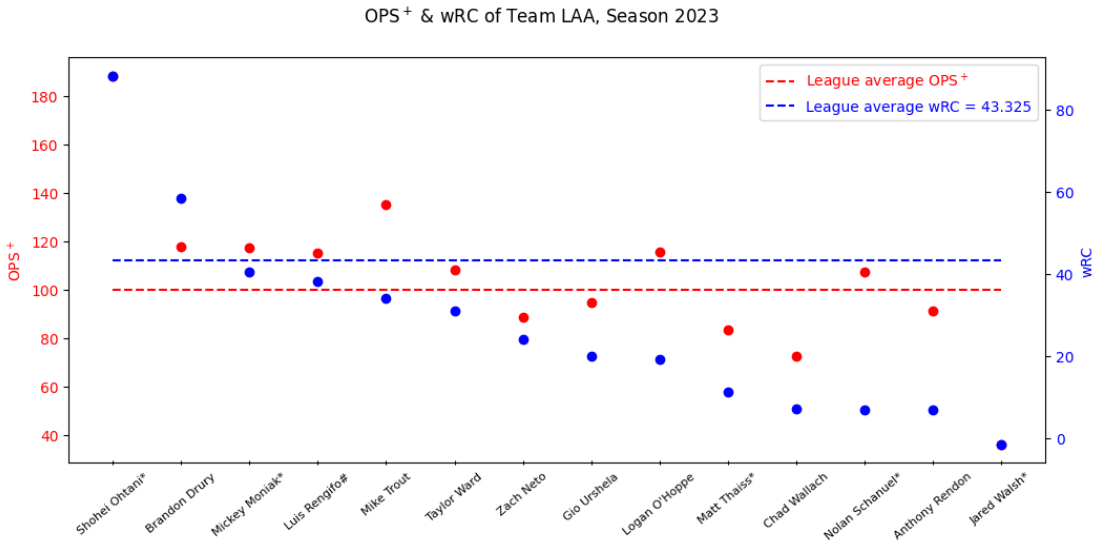
**Data:**

| Item | Description |
|---|---|
| data_batting_2021-2023.xlsx | Basic batting statistics of the Major League Baseball (MLB) from season 2021 to 2023 |
| data_pitching_2021-2023.xlsx | Basic pitching statistics of the MLB from season 2021 to 2023 |
| wOBA_FIP_constants.csv | Constants for wOBA and fielding independent pitching (FIP) |

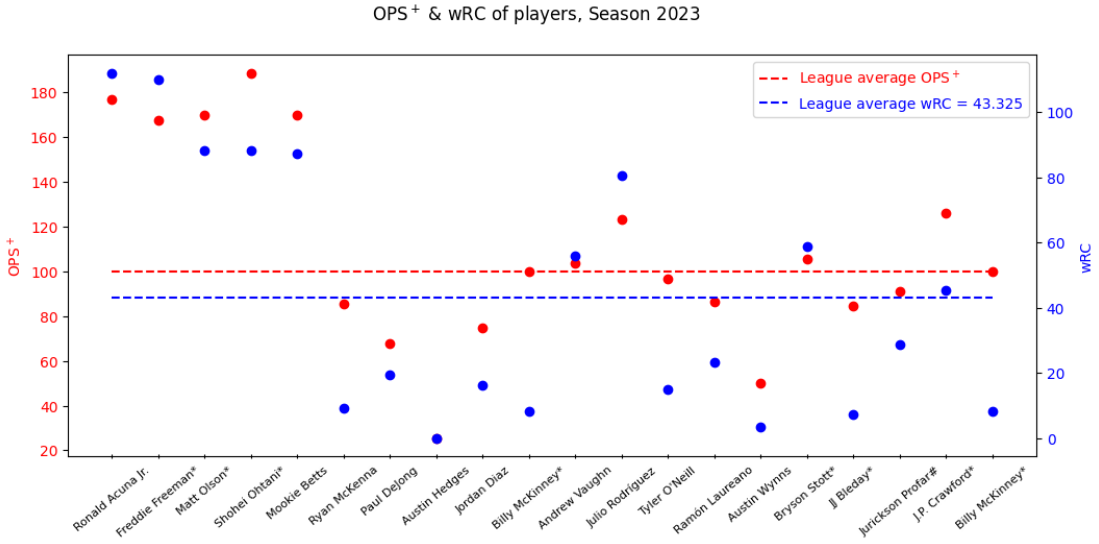
*Note.* The data of this homework is from Baseball Reference and FanGraphs BaseBall.

### Problem #1: Advanced batting statistics of one team in a specific season (30%)

Please write a program that calculates the advanced batting statistics ($OPS^+$, wOBA, wRC, ...) for the given data. Your program should plot a corresponding result. For example, the Los Angles Angels in MLB 2023 season

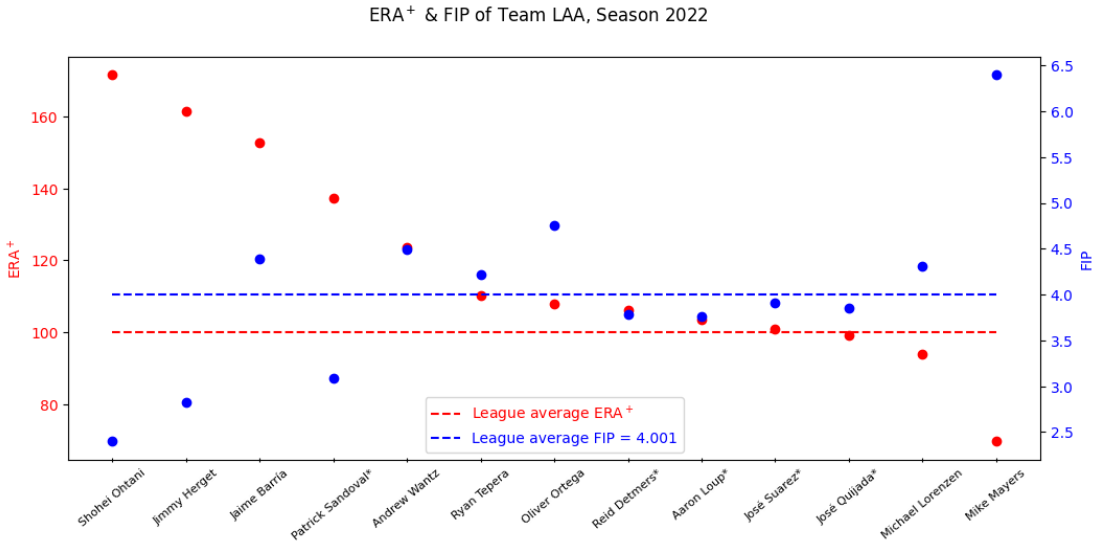


If no team is specified, your program should plot the top 5 players in wRC item and randomly choose 15 players for comparison.




**Problem #2: Advanced pitching statistics of one team in a specific season (30%)**

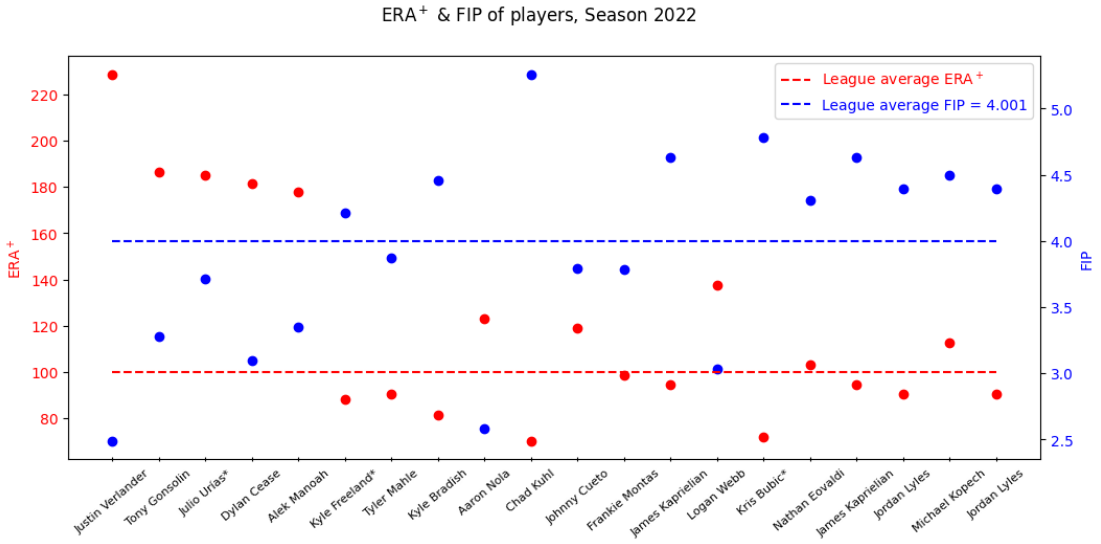
Please write a program that calculates the advanced pitching statistics for the given data. For simplicity, you only need to calculate the earned run average plus (ERA$^+$), walks plus hits per inning pitched (WHIP), and fielding independent pitching (FIP) in this homework. Your program should plot a corresponding result. For example, the Los Angles Angels in MLB 2022 season




**FRIENDLY REMINDER**

You will need to adjust the minimum inning pitched (IP) if you want to plot the result of one team.

If no team is specified, your program should plot the top 5 players in ERA$^+$ item and randomly choose 15 players for comparison.




Again, it is not necessary to follow the style of this document. You just need to provide the information we ask for.

### Problem #3: Summarize your final project (40%)

Please write a report for this project. You should explain the logic of your program and why you choose that team to plot. Here is a check list for your report:

| Index | Item | Check |
|---|---|---|
| 1 | Your name (otherwise you will get 0) | □ |
| 2 | Name of collaborator(s) | □ |
| 3 | Your result (figures) | □ |
| 4 | Why do you choose this team? | □ |
| 5 | Explain the logic of your program | □ |
| 6 | Anything you would like to say in the end of this semester | □ |

*Note*. You are welcome to add additional content in your report.

**Your report should be a .pdf file.**

Here is the sample code:

```
if __name__ == "__main__":
    parser = argparse.ArgumentParser(description="2023 NYCUDOPCS Final Project")
    parser.add_argument("--dir", default="", type=str, help="Directory of data")
    parser.add_argument("--year", default=2023, type=int, help="Which year? (default: 2023)")

    opt = parser.parse_args()

    solution1(
        dataPath=???,
        constPath=???,
        year=???,
        minPA=???,
        team=???,
        saveFig=???,
    )

    solution2(
        dataPath=???,
        constPath=???,
        year=???,
        minIP=???,
        team=???,
        saveFig=???,
    )
```

Please accomplish this homework with an organized code (e.g., with main script and function script). **Your main script file name must be 'main_final.py.'** Here is a template for your code structure:

```
112A_final_0123456789
      ├─ report.pdf       # Report of your final project
      ├─ module1.py       # Module 1 for final
      ├─ module2.py       # Module 2 for final
      ├─ ⋮                # Other modules if necessary
      └─ main_final.py    # Main script of final
```

**Hand in procedure:**

As we had mentioned in the lecture, you should list all your collaborators in your programs. Here is the template:

```
"""
Created on Sun Aug 7 01:23:45 2023

@author: Xi Winnie, student ID

@collaborators: EE Tsai, her student ID
"""
```

Please save your homework as a "**.zip**", "**.7z**", or "**.rar**" file, where the file name should follow this format:

112A_final_ID.zip

For example,

112A_final_0123456789.zip

Please note. **We are not going to accept any homework file with wrong file name, wrong file format, or without signature in main script**. Please double check the content of your file.

Once you have accomplished your works, you can submit your homework to the "E3@NYCU" system. There will be a section for uploading your homework.