

# Review Assignment (draft): Mini Baseball Simulation

The assignment is to write an application to simulate a batting simulation based on baseball rules.

Name the application ***firstName\_baseball.py***, where *firstName* is your first name.

Due: Before start of class Monday Sept 22.

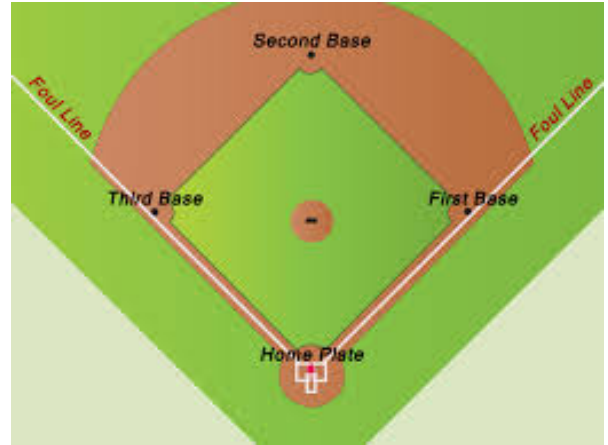
## General Baseball Background:

Players from one team takes turns having a baseball thrown (pitched) at them. The player swings a bat to hit the ball. **If hit**, the player then runs around bases placed in a diamond shape. See diagram.

Players try to run around from home base (or home plate), to first, to second, then third then finally back to home. The goal is to eventually make it to home base, whether when they hit or when other teammates hit. Doing so scores a run for the team.

However, often a player will only be able to run to first, or second, etc, (the other team is doing stuff to stop or take out the player). Most times a player will have to stop at a base.

They wait there while their next teammate bats – if their teammate hits the ball, then the player runs again.



## Basic Batting and Base Running Practice (85%):

The program will simulate a team of 9 players (a roster) practicing hitting a pitched ball.

The players will take turns, in order, to be “at-bat” and to try to hit the ball.

If a player successfully hits the ball, they advance to first base and the next player in the roster is “at-bat”.

Players only advance 1 base at a time.

Players have 3 attempts to hit the ball. If they miss after 3 attempts, they are “out” and are no longer at bat.

When a player is “out”, the next player in the roster is “at-bat”.

Players will advance along the bases. And move from first to second, then second to third, then third to home. The simulation will keep track of the number of times players make it to home.

Eg Cranswick is at first base

Lemon is “at-bat” and hits.

Cranswick advances to second base, while Lemon advances to first base.

Anytime 3 players are “out”, an “inning” is done, and any players on base (first, second or third), are removed from the bases.

When an inning is done, the simulation displays the “score” (ie the cumulative number of players who made it to home base).

The “inning” starts with no players on the bases, no outs and the next player in the roster “at-bat” (the previous player in the roster having been the third out of the last inning).

Eg Rhoden, Konupka, Repar are 3 players

Rhoden is on first base

Konupka misses 3 pitches and is out.

He is the third out for inning 6.

So inning 7 starts with no on base, no outs, and Repar “at-bat”

The practice (simulation) ends after 9 innings.

At the end of the practice the simulation displays the final “score”.

The pace of the game is controlled by the user – the user will press Enter to have a player swing for a hit.  
**The simulation should indicate whether player had a hit or a miss (and therefore is out)**  
Do not use timers to control game play as that will slow testing.

Each player will be assigned a percentage of being able to hit for a single base, written as a 3 digit decimal eg Ma hits for a single base 0.455 which is about 46%.

This hit percentage will be used to determine if that player hit the ball each pitch.

These statistics are hard-coded in the program.

The text-based display should show:

- inning
- score (both teams)
- number of outs for the inning
- player at-bat
- number of misses so far
- bases and any potential players on base

Some marks for creativity for the display.

**Marks for random progress submissions. Files titled firstName\_baseball\_draft.py**

Usual conventions apply.

**File Input (Additional 5%):**

The program will read in player statistics from a file named **player\_statistics.txt**.

Each line is a record of one player's statistics.

A record is defines as : name      base-hitting-percentage

Eg      Cranswick 0.377  
         Amirthalingam 0.602

**State in the program header if the program reads from a file as a first line in the description.**

**Full Game (Additional 10%):**

The program simulates a full baseball game.

(Actually the program only simulates the at-bat of one team while generating a score for the other team).

The game does not simulate a team in the field catching.

Players can hit for singles, doubles, triples and home runs.

There are no "balls" in the game (ie a pitched ball that the batter does not swing at).

Each inning starts with the user-controlled team ("home" team) at bat.

When the home team is done (3 outs), then it is the opposing team's "turn"

(all that means is that the program generates a random score based on the table below – the opposing team does not actually bat)

The game will end after the last inning and will state which team won and what the score was.

The program generates the runs scored per inning by the other team using the following probabilities:

Number of Runs	Probability (%)
0	50
1	20
2	14
3	7
4	5
5	3
6	1

If also inputting statistics from the **player\_statistics.txt** include probabilities for the player to hit doubles, triples and home runs.

Eg      Cranswick 0.310 0.205 0.133 0.188  
Amirthalingam 0.380 0.222 0.030 0.240

Note: The numbers should add up to less than 1 – the difference being the probability of a miss. In the example above, Cranswick has a 0.836 ( $0.310 + 0.205 + 0.133 + 0.188$ ) chance of hitting a “pitch” and making it to a base, and a 0.164 ( $1 - 0.836$ ) chance of missing a “pitch”

Some terminology:

single – a player hits and is able to run to first base only

double – a player hits and is able to run to second base

triple – a player hits and is able to run to third base

home run – a player hits and is able to run around to all the bases and back to home base, scoring a run