

## Homework 1

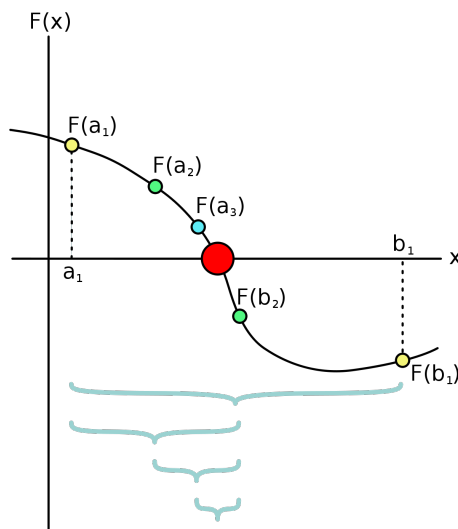
Release date: 2023/03/13

Due in class: 2023/03/22

(Submit your answers to Google Classroom)

1. Implement the angry bird game that we developed in class.
  - (a) Write all codes in .py format (do not use Jupyter notebook)
  - (b) Your code should have the `if __name__ == '__main__':` statement
  - (c) Use functions to group codes
  - (d) Make sure you have implemented all features we mentioned in class
  - (e) Please add comments to explain your code
  - (f) The header of your code should explain how to run use your code
  - (g) Your code must be able to handle invalid inputs (and not crashed)
2. Add a new feature that the game will automatically adjust the parameters and play the game for you.
  - (a) Fix the angle to 45 degrees, the AI player will automatically adjust the velocity until it hits the target (the pig).
  - (b) Fix the initial velocity but let the AI player to adjust the inclination angle for you.

Hints: the simplest way to implement such AI player is to use the “bisection” search (see Figure below).



Algorithm:

- “a” and “b” are two bracket values that include the solution “x”.
- Start from an initial guess of the solution (provided by the player)
- If  $f(a)$  and  $f(x)$  have the same sign, update a
- If  $f(a)$  and  $f(x)$  have different sign, update b
- set  $x = (a+b)/2$  for the next iteration
- repeat until converged to the true answer (hit the target value, which is the location of the pig).

- (c) redo program 2(a) and 2(b) but change the hit criterion from  $dx \leq 1$  meter to  $dx \leq 0.01$  meter. Could your AI player still hit the pig? How many trials did it need?
- (d) Please add comments to explain your code