1. Project Description:
    a. Name: sh00t y0ur sh0t
    b. Description: A game that allows users to participate in a short archery tournament where they are able to control the angle and power of the bow. There are two types of play. The first type would be a timed game play where the user can shoot to score as many points as they can. There are a total of 3 levels and each level will have different challenges. The first level would be basic stationary targets and a standard time of around 1 minute. The second level would be moving targets with a standard time of around 1 minute. The last level would be moving targets and obstacles such as wind and falling objects. The second type of game play would be playing against the computer. The player would do about 2-3 rounds against the computer in the 3 level environments.
2. Competitive Analysis:
    a. My game is similar to the game on the apple app store called Archery King however the controls are a little different. Since it is a mobile game, to aim you have to move the phone around, to shoot you have to press and then release. When you press you have pressed your finger to the screen the game allows you to zoom in and make your aim even better by letting you look through a sight mechanism (like a tiny binocular addition to look through and zoom in on the target). Another feature of the game is that you can play against random people on the internet and earn coins to buy additions to make the game play easier, such as a bow and arrow stabilizer or a better sight mechanism addition. This game also has different environments and seasons that are an additional obstacle in the game. My game will not have the capabilities to play against other random people on the internet and the shooting the arrow process will be different since my game is on the computer. I also will have additional obstacles on top of weather (in my case that would be the wind obstacle), because I am also planning to have falling objects. I will also not have any add ons to the bow and arrow equipment. I will also allow the user to control the power that they use to release the arrow. The rest of the game is conceptually similar to the mobile game since the players are shooting to get points and pass to the next levels of the game. I also have a baby AI instead of playing with strangers on the internet.
    b. Another game similar to mine is the stick man archery games. You use your mouse to aim and also get more power the more you move your mouse away from your character. However the game play is just shooting the arrow and trying to hit the target, once you miss the game is over. My game will not do that since I allow the user to have as many tries as they want regardless of whether they miss the target. My game will also have levels that allow the users to experience different environments.
3. Structural Plan:
    a. I will be using the MVC format to organize my code and the actions of the game. I will be putting all the code in one file because there is no real need to separate the code in different files. I will make a user object class and a bow and arrow object class to easily store and organize the information about these parts of the

game. I will be making a separate algorithm function to find how the power and angle the user chooses will affect how the arrow moves. This function is where I will incorporate the projectile motion logic that runs the game. I will also make a function that deals with the baby AI portion of the game. The function will deal with the precision the AI will have depending on the level the user chooses.

4. Algorithmic Plan: projectile motion and baby AI:
    a. Projectile motion: Since I will know the force that the player uses and the angle that they release the arrow at I will be able to compute the end position of the arrow using the initial speed (which will be calculated using $v = IBO + (L - 30) * 10 - W / 3 + \min(0, -(A - 5D)/3)$ where v is the actual arrow speed in ft/s, IBO is the arrow speed according to the IBO specification in ft/s, L is the draw length in inches, W is the additional weight on the bowstring in grains, A is the arrow weight in grains, and, D is the draw weight in pounds. IBO is International Bowhunting Organization specification for the bow which I will be choosing to be a common one, most probably 345ft/s, https://www.omnicalculator.com/physics/arrow-speed#understanding-bow-speed-ibo-specification). I will also be using the angle that the arrow is released and use projectile motion formulas $vf^2 = v0^2 + 2ax$ (vf is final velocity, v0 is initial velocity, a is acceleration of gravity and x is the distance travelled) and I will use $x = v0*t + \frac{1}{2}*a*t^2$ (t is time other variables are the same as previously described. I will use these equations in conjunction to find where the arrow has landed and if it hit the target or not.
    b. For the baby AI will have two degrees to its randomness. Firstly it will have a range of randomness that it will be shooting in. The smaller the range the more precise the baby AI will be and the more likely it is to get closer to the target and vice versa, the larger the range the less likely it is to be hitting the target. The second degree of randomness is that it will randomly choose between the different sizes of the ranges, sometimes it will get the larger ranges making it miss the target and other times it will get a smaller range making it more likely to hit the target. These range constraints, which will most likely be what initial angle and force the AI chooses, will come from the projectile motion motion formula. The code will find which settings are needed for a bullseye and add/subtract to these parameters (angle and force). If the user choses a harder AI version the ranges will be smaller and thus the AI will be more precise and likely to hit the target.

5. Timeline:
    a. Finish the main algorithmic portions of the project by December 1st
    b. Finish the main graphics portions by December 5th
    c. Add finishing touches to the graphics and implement score

6. Version Control Plan:
    a. I will be storing my code on github by making a new repository for this project and committing my code to github. I will use a working branch each time I change something or add something and commit only the working versions to the main
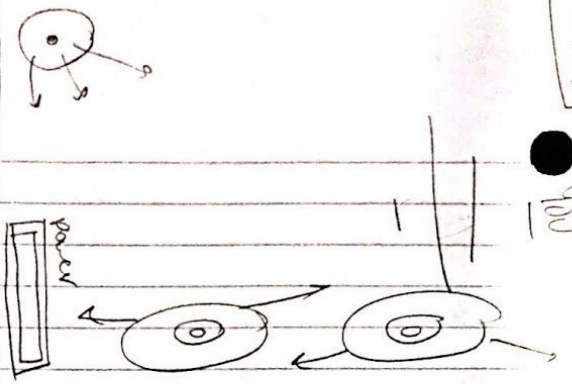
branch.

7. Module List: Not Currently planning on using any external modules

8. Story board

Panel 5

Panel 7

Panel 6

Panel 8

YOU

computer

YOU

computer

player

player

player
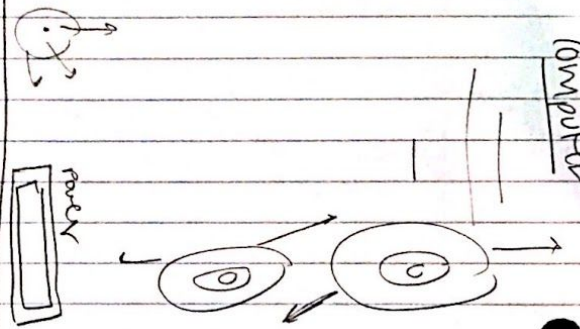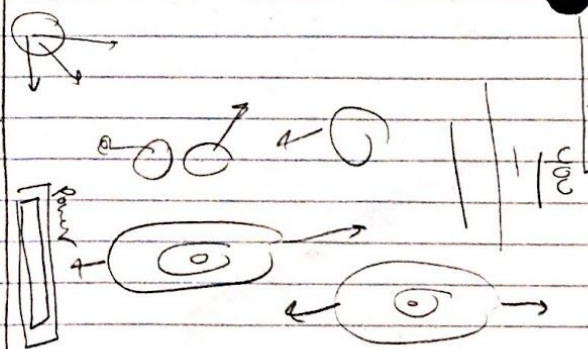
player
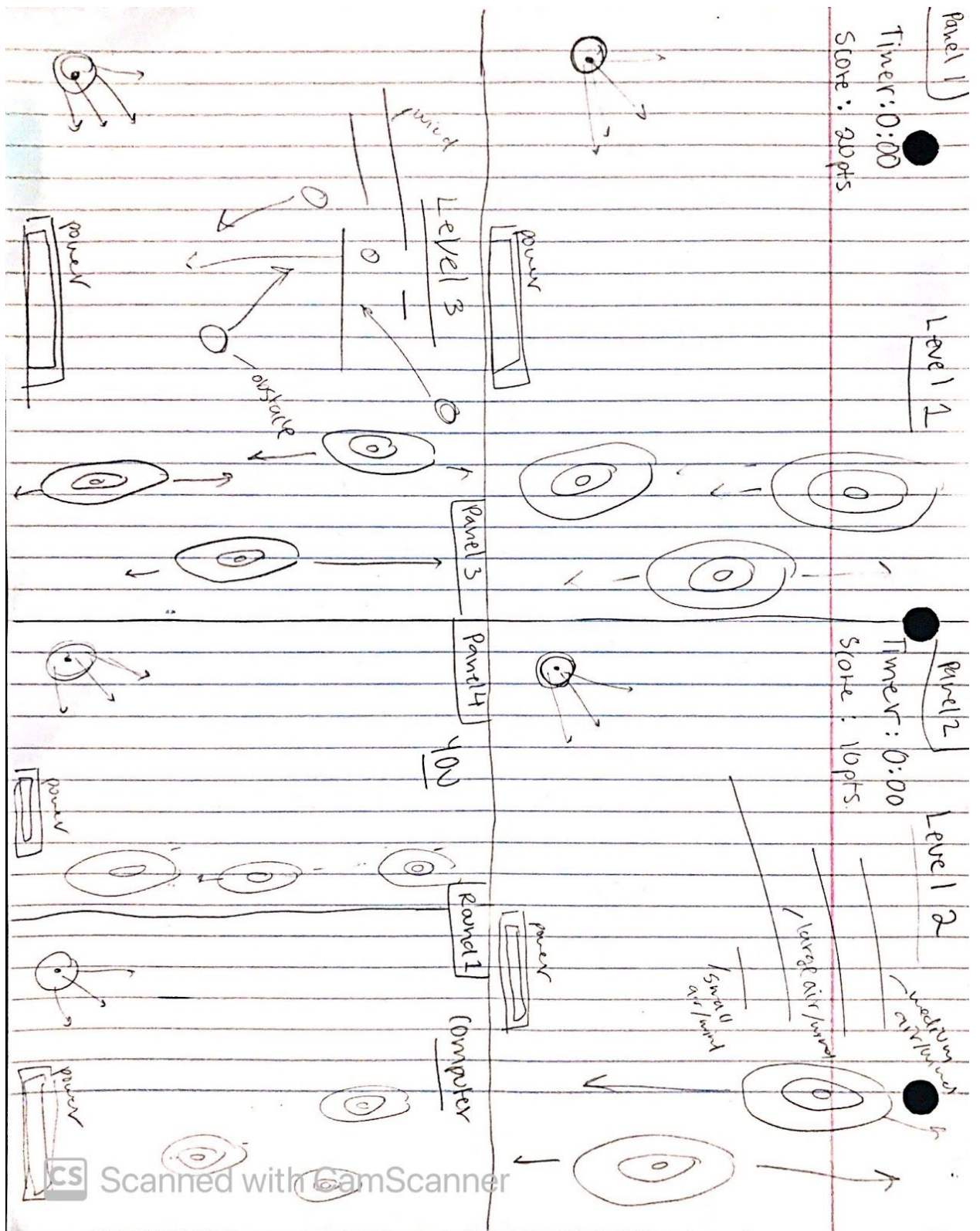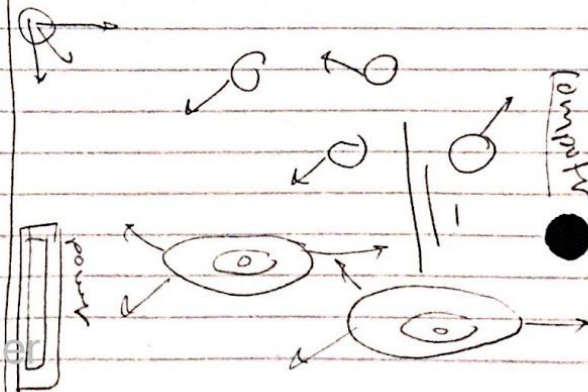
Finish Level

Score: _____

MAIN   NEXT Level

MAIN:

Levels: 1 2 3

computer: play AI