Project 1

Title

Yahtzee! V.8

Course

CIS-5

(CSC-5 46688)

Due Date

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Author

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1 Introduction

Yahtzee is a dice game made by Milton Bradley. The goal of the game is to score points by rolling five dice. The dice can be rolled up to three times in a turn. By selecting different combinations the players can set aside dice to score different combinations of points. The game has thirteen rounds and at the end of each round the player chooses which scoring category they want to use for that round. Once a category has been used, it cannot be used again. A Yahtzee is a five-of-a-kind that scores 50 points, the highest of all categories. The winner is the player who scores the most points.

2 Game Play and Rules

Object of the Game:

Roll dice to get the highest score after all 13 rounds.

Game Play

In summary:

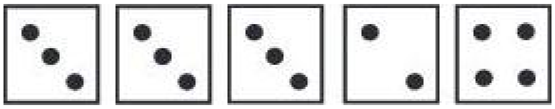
1. *Roll up to 3 times each turn to rack up the best possible score.*
2. *Decide which dice combo you're going for.*
3. *After each turn, write your score in one empty box on the scorecard.*
4. *Each player in turn places all 5 dice in the cup, shakes the cup and rolls out the dice. Each turn consists of a maximum of three rolls. The first roll must be made with all five dice. If the player chooses to roll a second and, if desired, a third time, they may pick up any or all the dice and roll again.*

3. How to play:

1. Roll all 5 dice.
    a. If you get the exact combo you want, mark your scorecard right away. Otherwise, continue with your 2nd roll.
2. Your second roll:
    a. Set aside any keepers' and re-roll the rest.
        i. Hate them all? Re-roll them all. If you get the exact combo you need, mark your scorecard. Otherwise, continue with your 3rd roll.
3. Your third and final roll:
    a. If you still haven't nailed a combo, or just want to maximize your score:
    b. Roll some or all of your dice (as above), even any keepers you might have set aside.
    c. You must enter a score at the end of this roll, whether or not you like your dice.
    d. If your roll doesn't suit any of your empty boxes, you have to enter a zero somewhere. BUT scoring even a single die value is better than a zero.

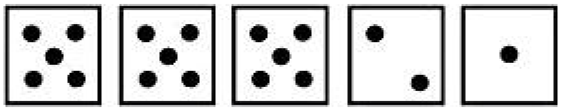
4.Scoring

1. There are 13 scoring boxes. On each completed turn, the player must score in one of the 13 boxes. The boxes may be filled in any order, according to the player's best judgment.
2. The score card has an upper section and a lower section:
   a. Upper Section
      i. The upper section contains six boxes labeled 1 to 6 ("Aces", "Twos", "Threes", "Fours", "Fives" and "Sixes").
      ii. When a player chooses to score in the Upper Section,theycounts and add only the dice with the same number and enter the total of these dice in the appropriate box.
      iii. If a player, on his turn, rolls and elects to take his score in the Upper Section,they would enter 9 in the "Threes" box.
      iv. But they are also allowed to score a 2 in the "Twos" Box or a 4 in

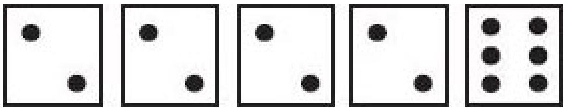


the "Fours" box. The players can also score a zero in th

      v.
      vi. e Aces box.
   b. Lower Section
      i. In the lower section, you score for various combinations and they are played exactly as indicated:
      ii. 3 of a kind
         1. The "3 of a kind" box may be filled in only if the dice show at least 3 of the same number. For example:

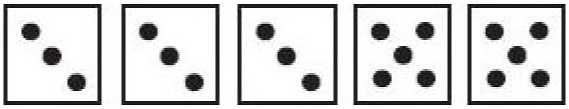


            a. This would score 18 (total of all dice).
      iii. 4 of a kind
         1. Score the total of all dice provided they include 4 dice of the same number. For example:
            a. This would score 14 (total of all dice) in the "4 of a kind" box. (You may also score in "3 of a kind" or in the upper section).



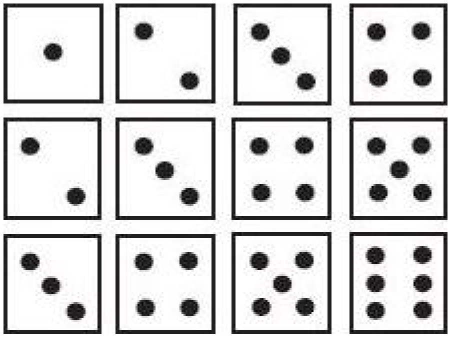
      iv. Full House

1. You need to roll both a "3 of a kind" and a pair. A "Full House" scores 25 points. (You may also score in "3 of a kind" or in the upper section).



v. Small Straight

1. This is any sequence of four numbers, such as:

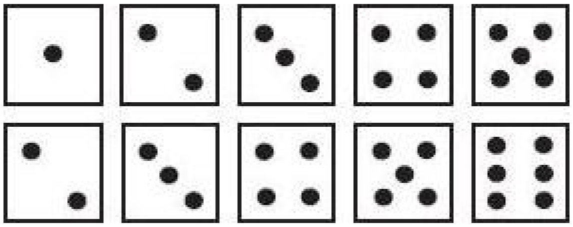


vi. The 5th die can be any number. Any "Small Straight" is valued at 30 points.

c. Large Straight

i. This is a sequence of five numbers, either:

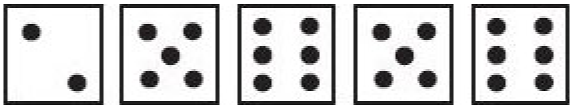
1. A "Large Straight" is valued at 40 points.
2. (You may also score a Large Straight in the Small Straight box).



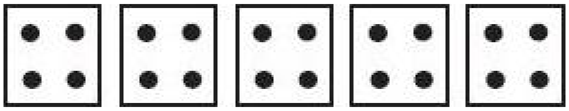
d. Chance

i. This offers a player the opportunity to score on any turn where they do not choose to score in any of the other open boxes. Mark scores by totalling the number of points on all dice.

ii. This combination scores 24 points.



Yahtzee
This is any "five of a kind". Score 50 points in the "Yahtzee" box.



5.Bonus

1. You get a bonus of 35 points if the total number of points you scored in the upper section is 63 or higher. (For quick calculation, 63 may be reached by scoring 3 "Aces", "Twos", and so on through "Sixes").
    a. A bonus can be obtained by having a total of 63 points or more scored in any manner in the Upper Section
2. If you roll multiple Yahtzee, you can rack up a seriously high score.
    a. If you roll a Yahtzee and you have already filled in the Yahtzee box with a 50 , you get a 100-point bonus!
    b. Take one bonus chip, then place a checkmark in the Yahtzee bonus box . Then fill in one of the 13 boxes on your score card according to the Joker Rules (see below).

6.End of the Game

The player with the highest grand total at the end of all 13 rounds is the winner.

7.My Approach to the Game

7.1 Translating Game Play Rules to Programming Language

My main concerns when developing the program for this game was the scoring. The majority of the work will be how to interpret the random input of 6 integers. At first, my solution was to use functions and bools to determine if the integers matched to a score and if it were true, output the value for the user to choose. Upon further revisions, I realized how difficult it was to sort and organize the information from the six integers when determining the correct output so I shifted to arrays. With arrays I was able to sort the integers in order and create simple if statements to check values.

7.2 My Similarities to the Board Game

My goal was to automate the rolling and scoring of the game. After all the dice rolling decisions have been made. The player is shown what choices are available to them. After selecting which score works best for them, the program automatically rolls the next set of dice and repeats for all 13 turns. As the player selects each score, the total is continuously added between rounds and is displayed at the end.

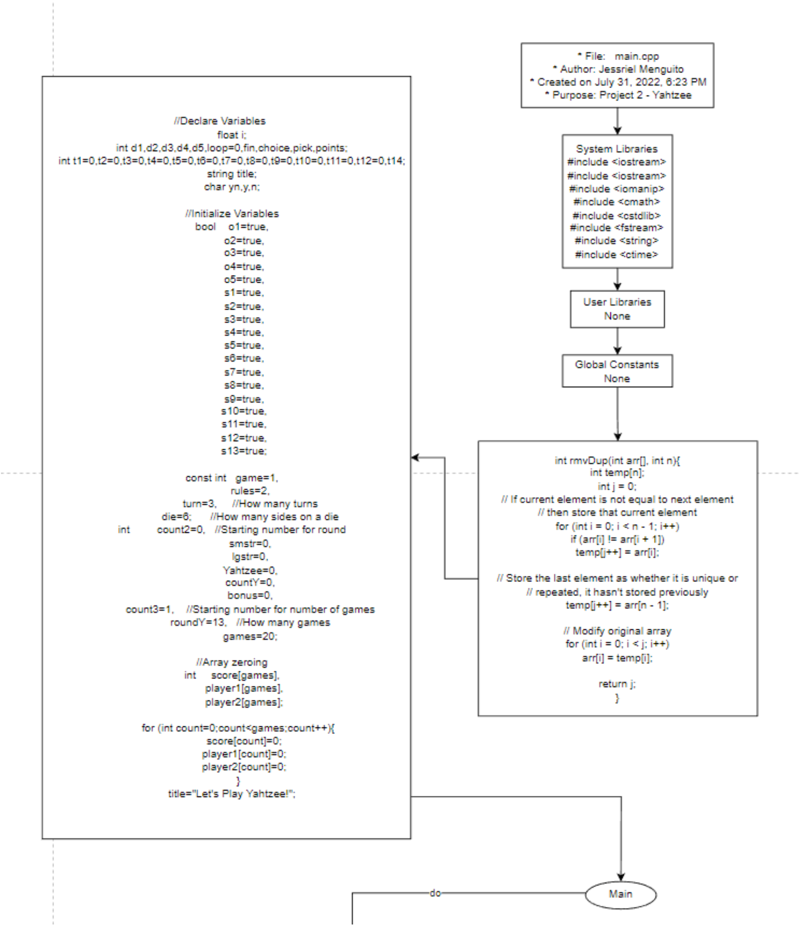
At this current iteration, the program works for a single player. It basically will take the place of a player's dice roll and score keeper.

7.3 The Logic

Flow Chart

For readability, I have broken up my flow chart in several sections.

- Opening Comments
- Bring in system libraries
- Enter main
- Declare all variables. Initiate required variables.



```
* File:   main.cpp
* Author: Jessriel Menguito
* Created on July 31, 2022, 6:23 PM
* Purpose: Project 2 - Yahtzee
```

```
System Libraries
#include <iostream>
#include <iostream>
#include <iomanip>
#include <cmath>
#include <cstdlib>
#include <fstream>
#include <string>
#include <ctime>
```

```
int rmvDup(int arr[], int n){
int temp[n];
int j = 0;
// If current element is not equal to next element
// then store that current element
for (int i = 0; i < n - 1; i++)
if (arr[i] != arr[i + 1])
temp[j++] = arr[i];

// Store the last element as whether it is unique or
// repeated, it hasn't stored previously
temp[j++] = arr[n - 1];

// Modify original array
for (int i = 0; i < j; i++)
arr[i] = temp[i];

return j;
}
```

```
//Declare Variables
float i;
int d1,d2,d3,d4,d5,loop=0,fin,choice,pick,points;
int t1=0,t2=0,t3=0,t4=0,t5=0,t6=0,t7=0,t8=0,t9=0,t10=0,t11=0,t12=0,t14;
string title;
char yn,y,n;

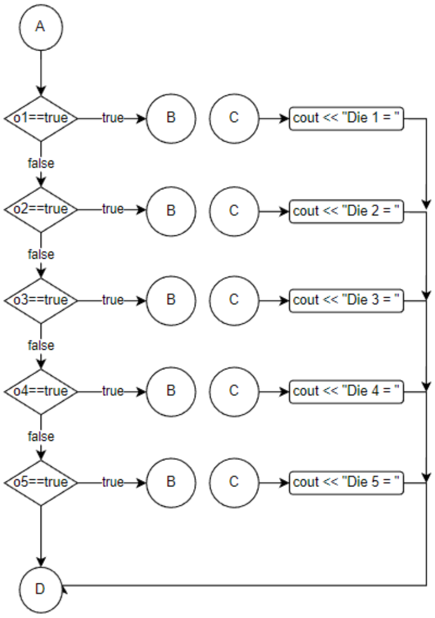
//Initialize Variables
bool    o1=true,
        o2=true,
        o3=true,
        o4=true,
        o5=true,
        s1=true,
        s2=true,
        s3=true,
        s4=true,
        s5=true,
        s6=true,
        s7=true,
        s8=true,
        s9=true,
        s10=true,
        s11=true,
        s12=true,
        s13=true;

const int   game=1,
            rules=2,
        turn=3,     //How many turns
    die=6;      //How many sides on a die
int         count2=0,   //Starting number for round
            smstr=0,
            lgstr=0,
            Yahtzee=0,
            countY=0,
            bonus=0,
    count3=1,    //Starting number for number of games
    roundY=13,   //How many games
            games=20;

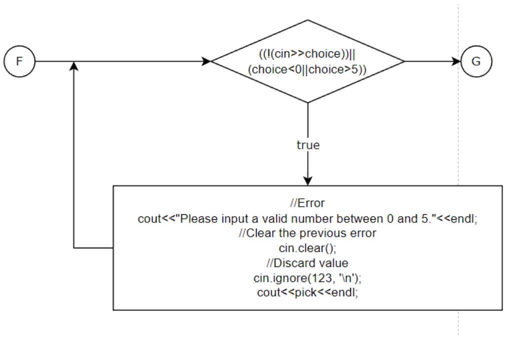
//Array zeroing
int     score[games],
        player1[games],
        player2[games];

for (int count=0;count<games;count++){
score[count]=0;
player1[count]=0;
player2[count]=0;
}
title="Let's Play Yahtzee!";
```

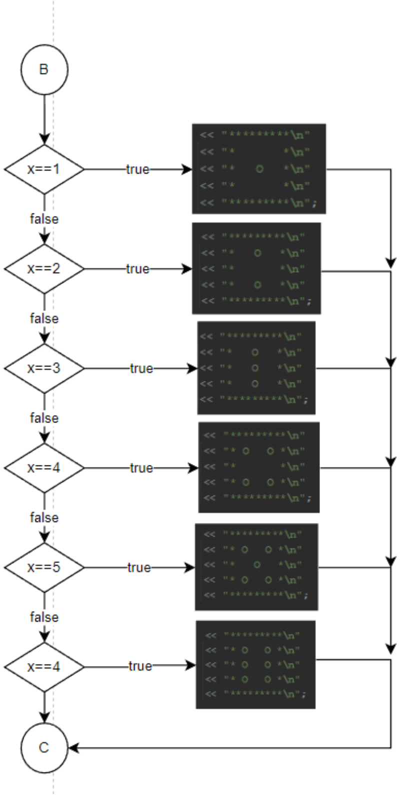
- Roll each die with bool true
- Call function where if true show die and ASCII art
- Return to the for loop at “D”.



- While for loop is true:
- 1. Get input from the player how many dice they want to set aside and verify input.



```
//Error
cout<<"Please input a valid number between 0 and 5."<<endl;
//Clear the previous error
cin.clear();
//Discard value
cin.ignore(123, '\n');
cout<<pick<<endl;
```



```
<< "**********\n"
<< "*        *\n"
<< "*   O    *\n"
<< "*        *\n"
<< "**********\n";
```

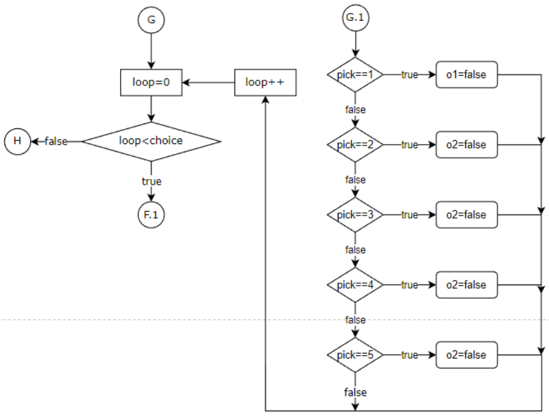
```
<< "**********\n"
<< "*   O    *\n"
<< "*        *\n"
<< "*   O    *\n"
<< "**********\n";
```

```
<< "**********\n"
<< "*   O    *\n"
<< "*   O    *\n"
<< "*   O    *\n"
<< "**********\n";
```

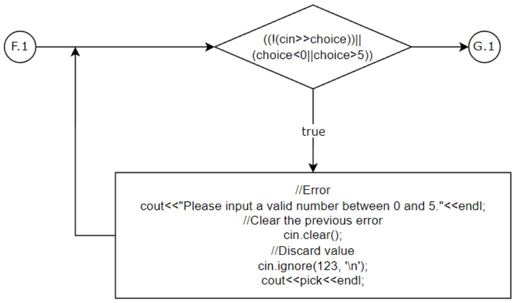
```
<< "**********\n"
<< "* O    O *\n"
<< "*        *\n"
<< "* O    O *\n"
<< "**********\n";
```

```
<< "**********\n"
<< "* O    O *\n"
<< "*   O    *\n"
<< "* O    O *\n"
<< "**********\n";
```

```
<< "**********\n"
<< "* O    O *\n"
<< "* O    O *\n"
<< "* O    O *\n"
<< "**********\n";
```



- Start for loop where it loops equal to the previous input. Then ask the player which die they want to set aside, verifying each time.



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//Error
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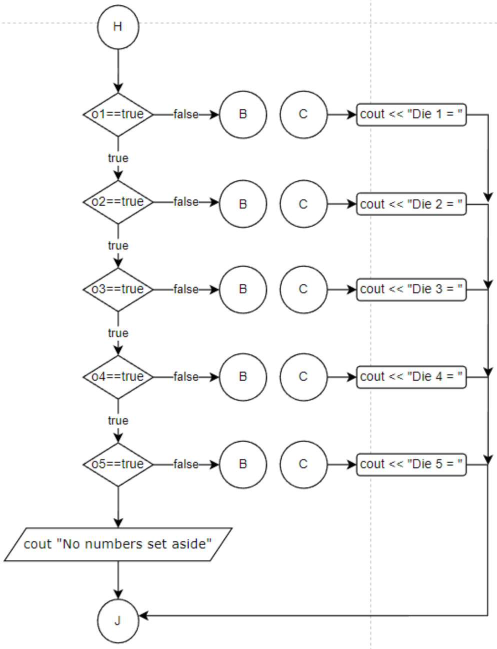
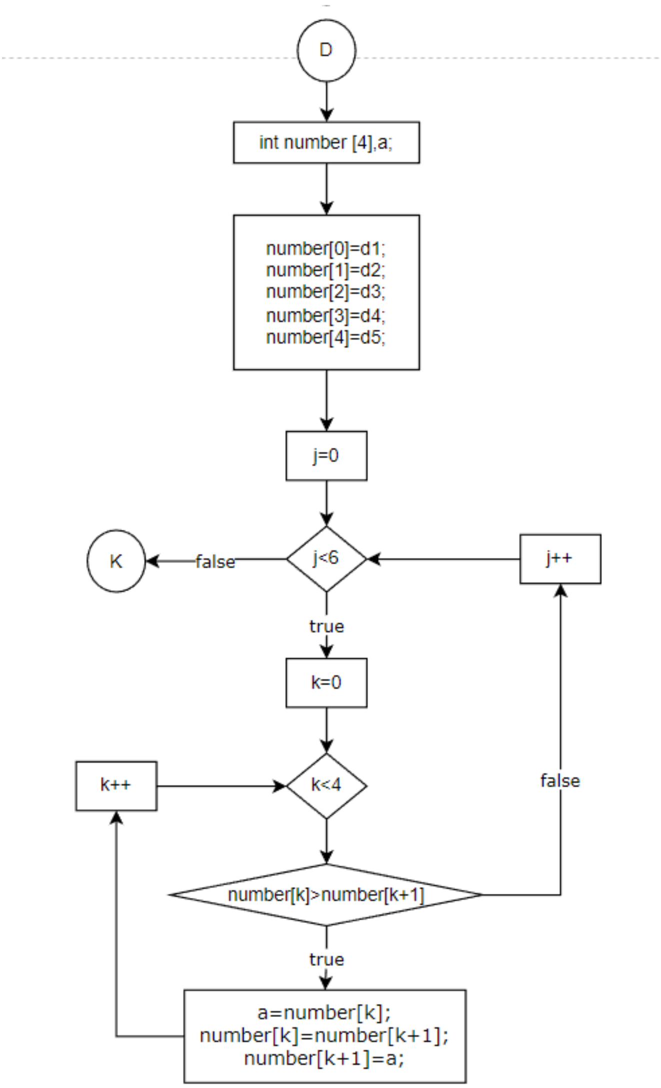
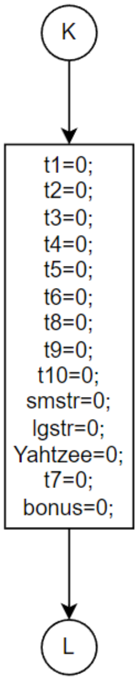


- At “J” return to the for loop and contine loop until “count2+1<turn”. Then “count2++”.

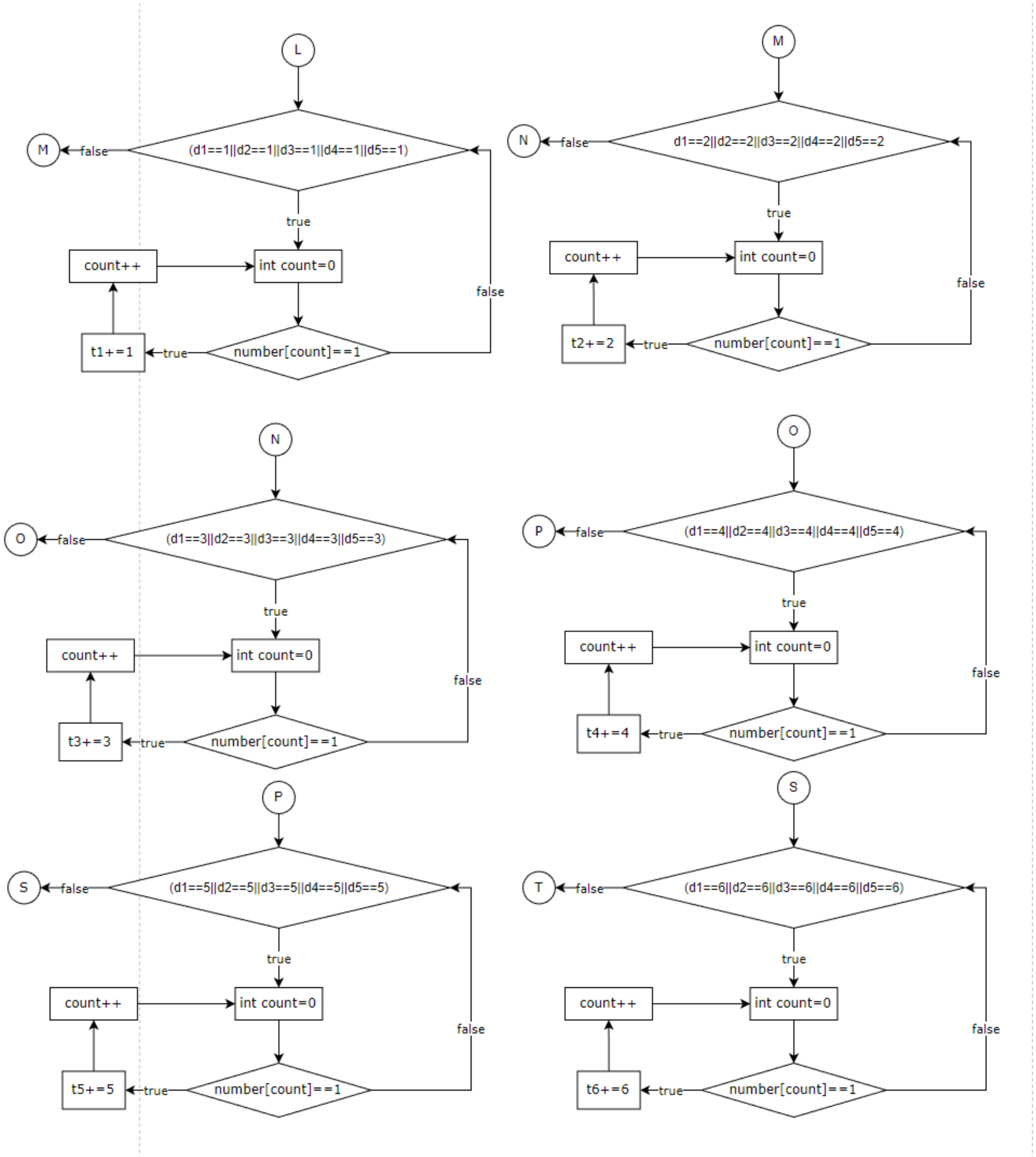
- Show the player which dice(die) they have chosen to set aside via function where bools equal false.

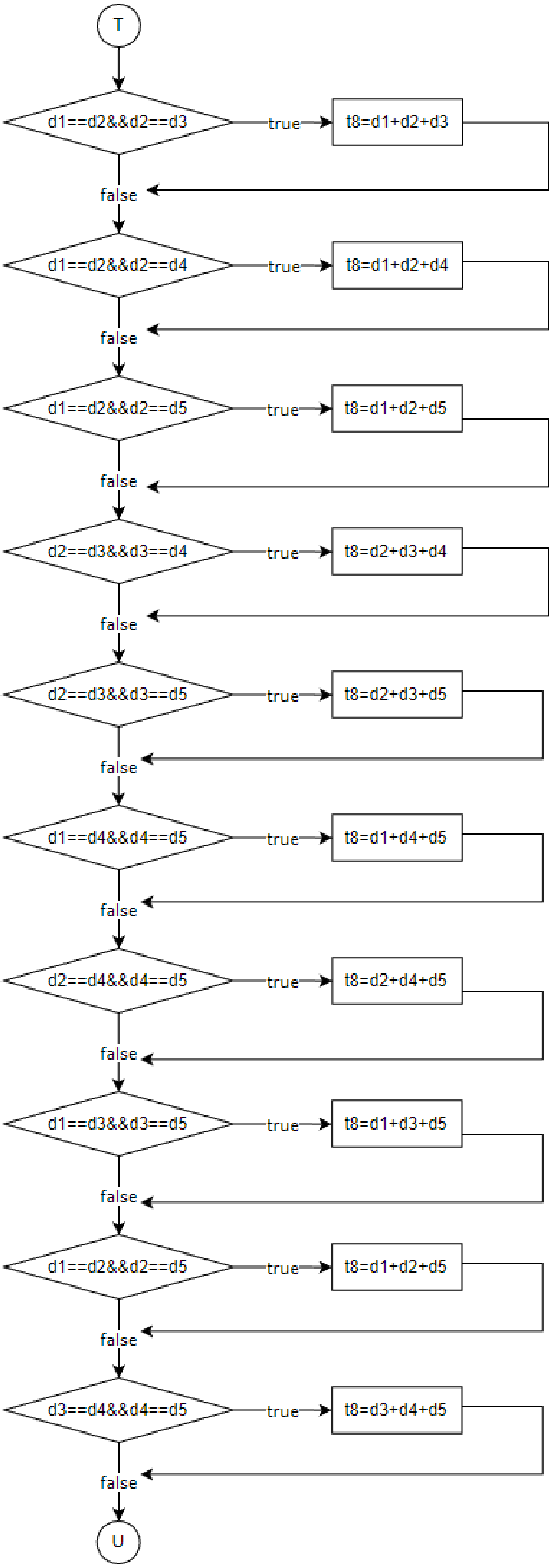


- Transfer all dice numbers to “number” array.
- Then sort the numbers from smallest to largest. This will be necessary when we need to determine small straights and long straights in the scoring.
- Reset all variables to 0 if this is not the first time through the loop.



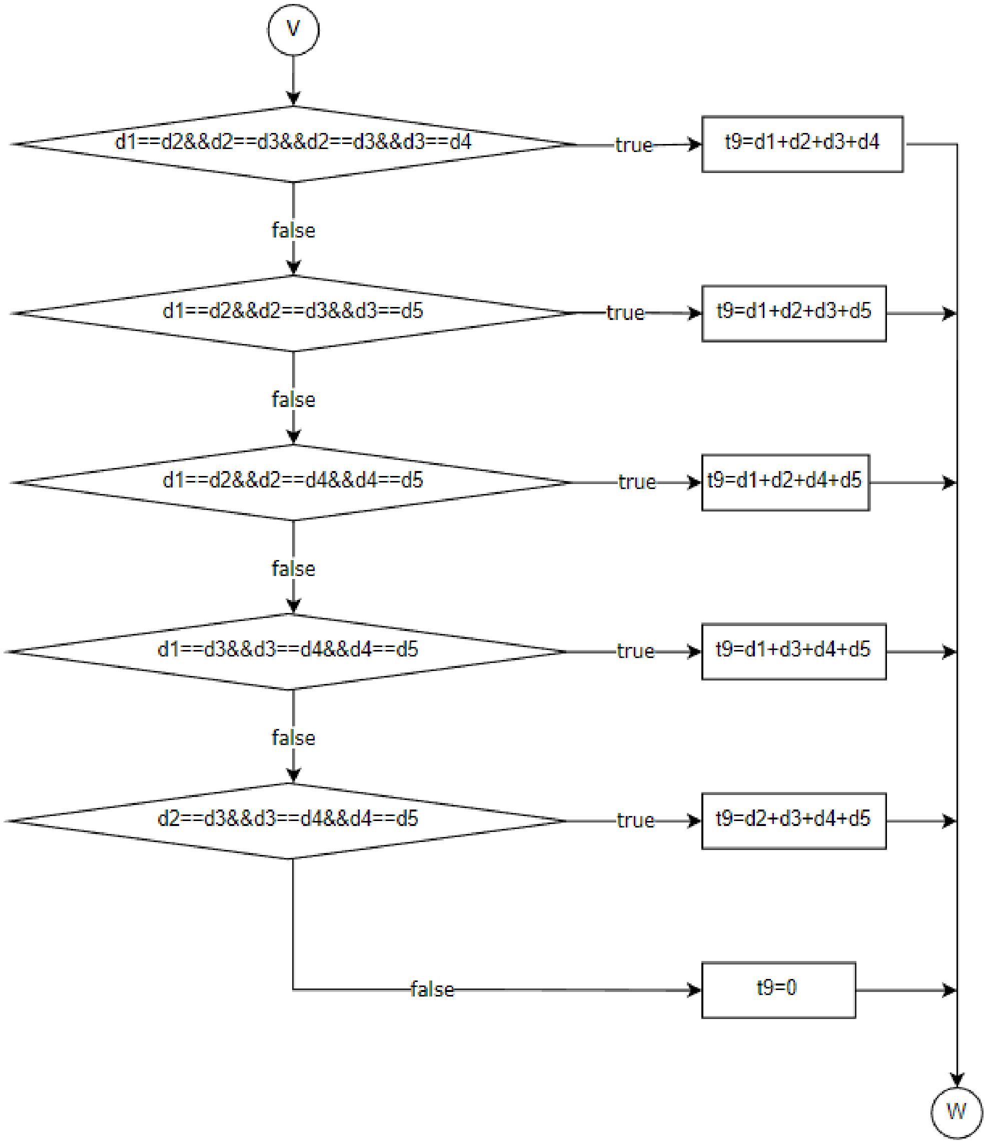
- Using a for loop to check each value in the “number” array and if it equals to 1, add it to “t1”. This is repeated for numbers 2-6.

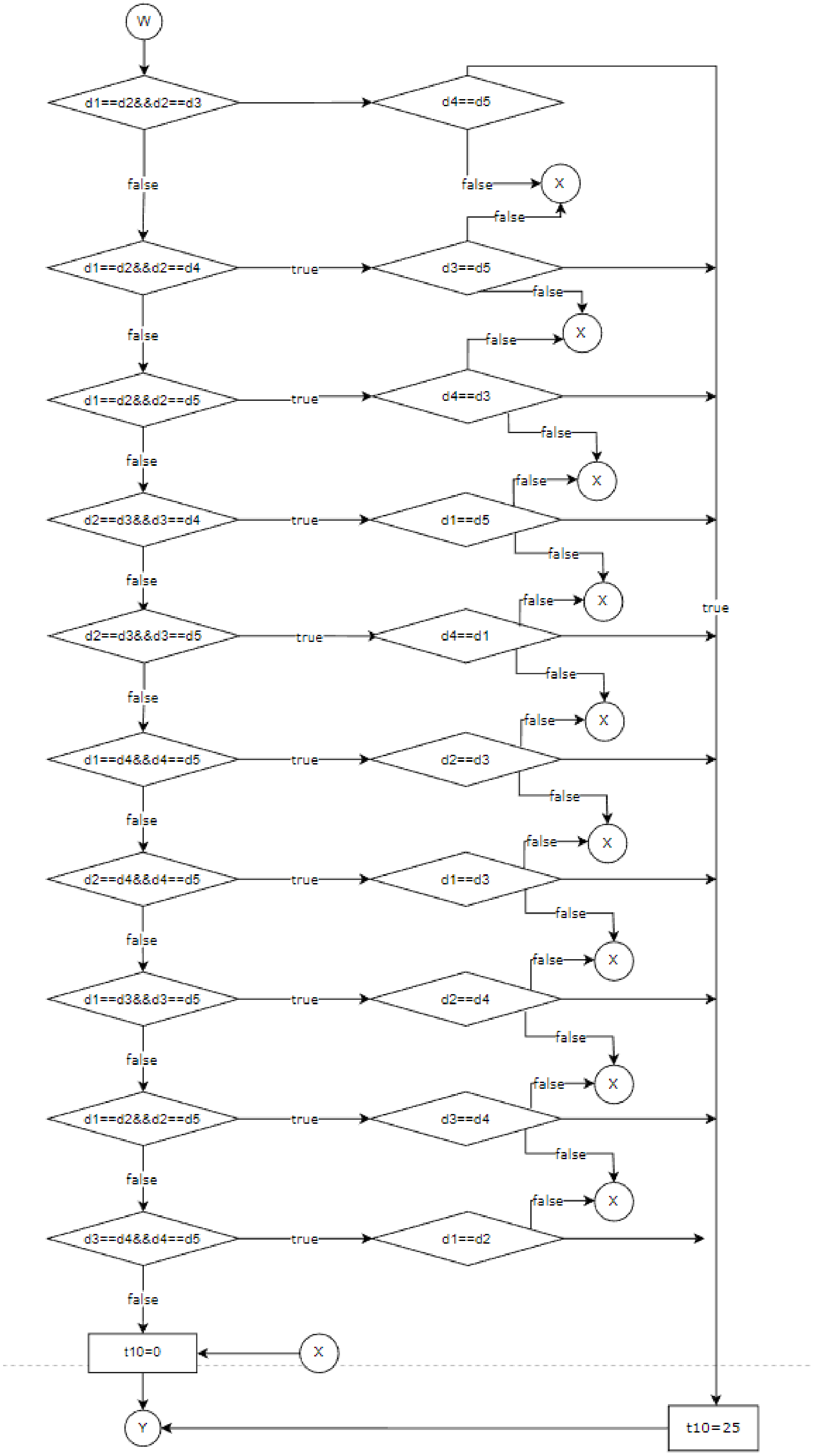




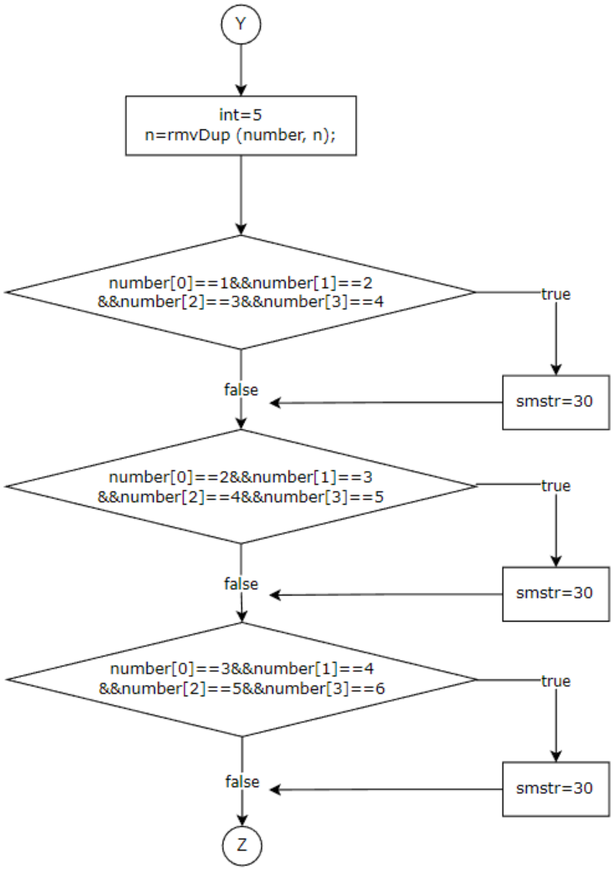
- Using brute force, I checked each possible combination of every triplet. If the triplet was found, I then added all values together.

- Using brute force, I checked each possible combination of every four-of-a-kind.. If the found, I then added all values together.

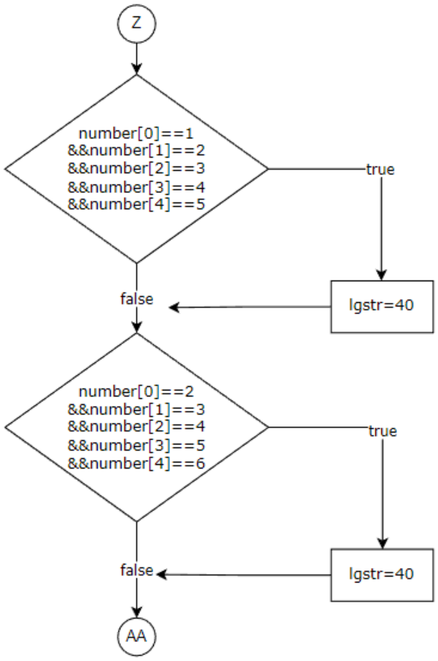




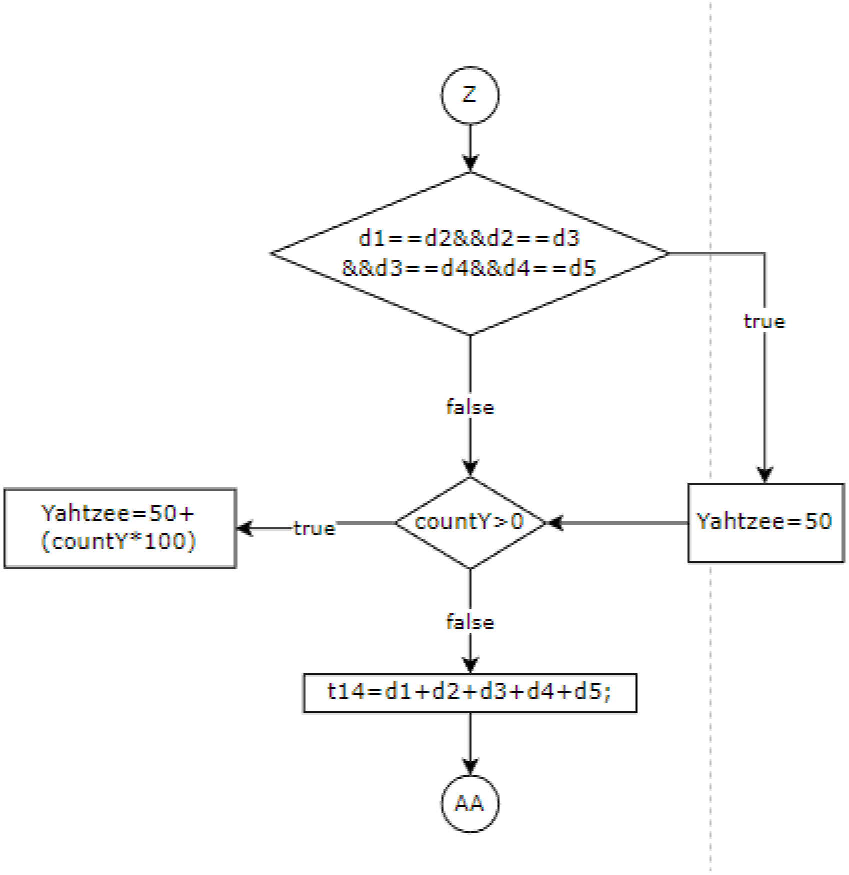
- Using the previous method to check triplets, I added an if statement to check if the remaining numbers are pairs. If true then, “t10” will equal 25.


Y
int=5
n=rmvDup (number, n);
number[0]==1&&number[1]==2
&&number[2]==3&&number[3]==4
true
smstr=30
false
number[0]==2&&number[1]==3
&&number[2]==4&&number[3]==5
true
smstr=30
false
number[0]==3&&number[1]==4
&&number[2]==5&&number[3]==6
true
smstr=30
false
Z

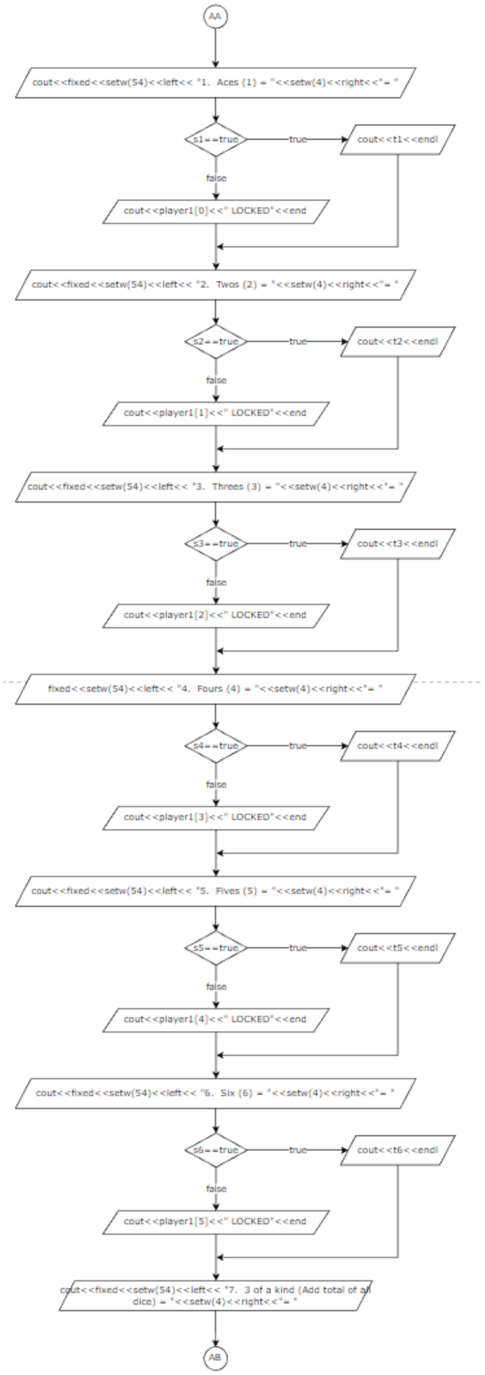
- Using the number array. I checked if the values, which were already ordered numerically, match a continuous “small straight”.

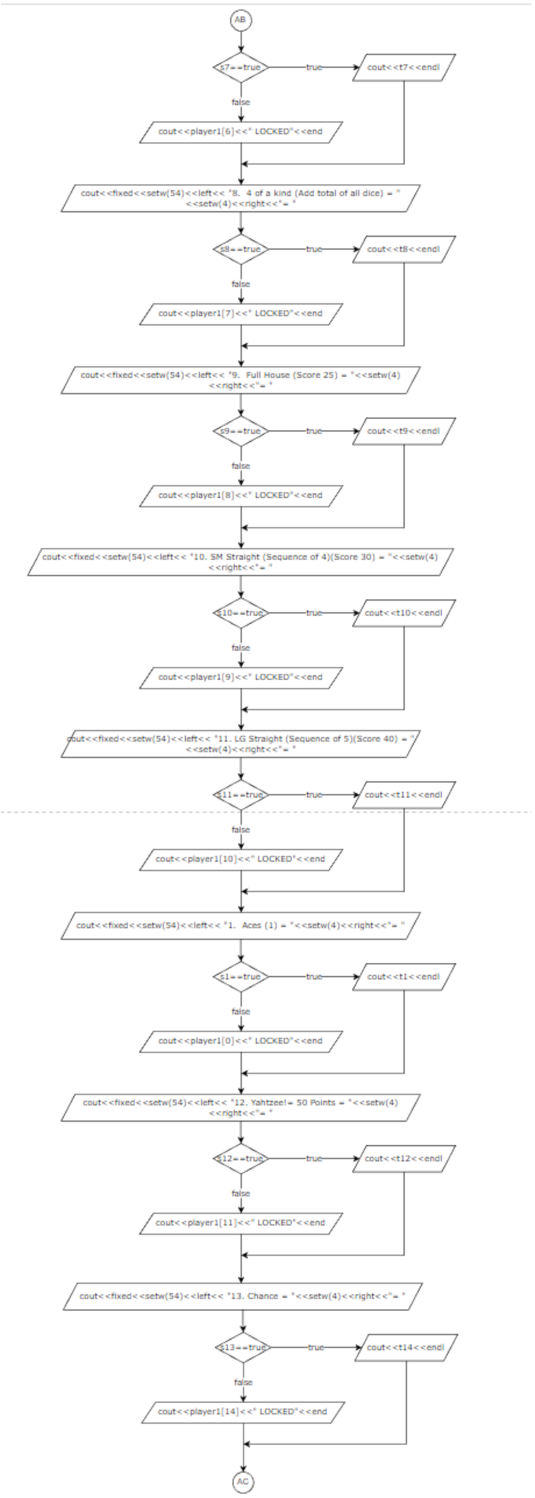


- Like above, I checked if the values match a continuous “large straight”.

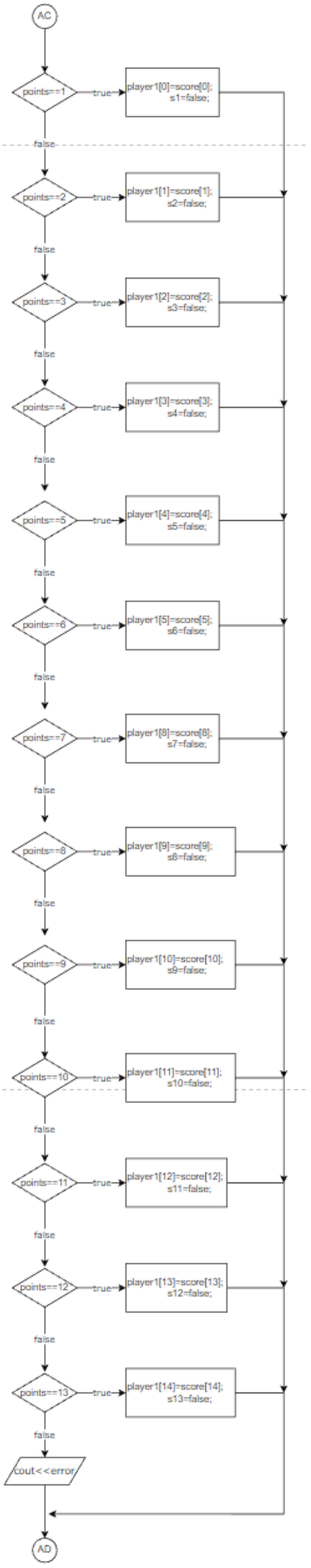


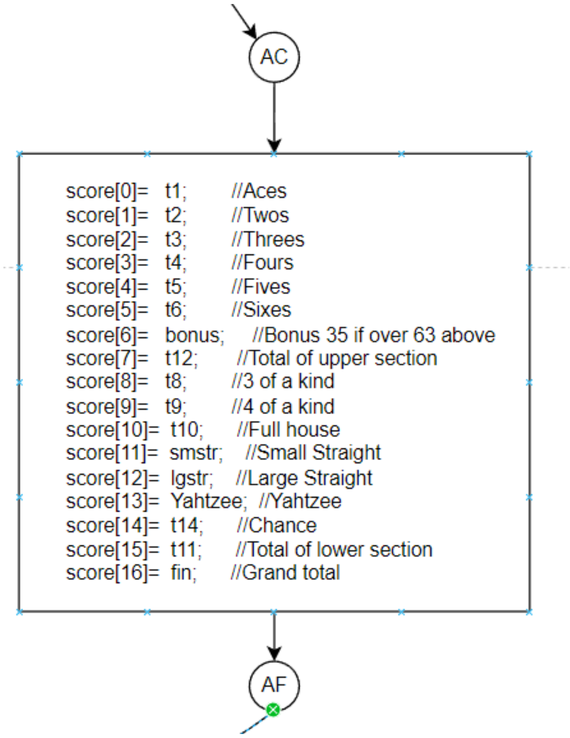
- The program checks each value against each other. If all values match, then a Yahtzee is scored. If more than one Yahtzee is score, an additional 100 points is earned.
- After Yahtzee, the Chance value is added to “t14”.


AA
cout<<fixed<<setw(54)<<left<< "1. Aces (1) = "<<setw(4)<<right<<"= "
s1==true
true
cout<<t1<<endl
false
cout<<player1[0]<<" LOCKED"<<end
cout<<fixed<<setw(54)<<left<< "2. Twos (2) = "<<setw(4)<<right<<"= "
s2==true
true
cout<<t2<<endl
false
cout<<player1[1]<<" LOCKED"<<end
cout<<fixed<<setw(54)<<left<< "3. Threes (3) = "<<setw(4)<<right<<"= "
s3==true
true
cout<<t3<<endl
false
cout<<player1[2]<<" LOCKED"<<end
fixed<<setw(54)<<left<< "4. Fours (4) = "<<setw(4)<<right<<"= "
s4==true
true
cout<<t4<<endl
false
cout<<player1[3]<<" LOCKED"<<end
cout<<fixed<<setw(54)<<left<< "5. Fives (5) = "<<setw(4)<<right<<"= "
s5==true
true
cout<<t5<<endl
false
cout<<player1[4]<<" LOCKED"<<end
cout<<fixed<<setw(54)<<left<< "6. Six (6) = "<<setw(4)<<right<<"= "
s6==true
true
cout<<t6<<endl
false
cout<<player1[5]<<" LOCKED"<<end
cout<<fixed<<setw(54)<<left<< "7. 3 of a kind (Add total of all dice) = "<<setw(4)<<right<<"= "
AB


AB
s7==true
true
cout<<t7<<endl
false
cout<<player1[6]<<" LOCKED"<<end
cout<<fixed<<setw(54)<<left<< "8. 4 of a kind (Add total of all dice) = "<<setw(4)<<right<<"= "
s8==true
true
cout<<t8<<endl
false
cout<<player1[7]<<" LOCKED"<<end
cout<<fixed<<setw(54)<<left<< "9. Full House (Score 25) = "<<setw(4)<<right<<"= "
s9==true
true
cout<<t9<<endl
false
cout<<player1[8]<<" LOCKED"<<end
cout<<fixed<<setw(54)<<left<< "10. SM Straight (Sequence of 4)(Score 30) = "<<setw(4)<<right<<"= "
s10==true
true
cout<<t10<<endl
false
cout<<player1[9]<<" LOCKED"<<end
cout<<fixed<<setw(54)<<left<< "11. LG Straight (Sequence of 5)(Score 40) = "<<setw(4)<<right<<"= "
s11==true
true
cout<<t11<<endl
false
cout<<player1[10]<<" LOCKED"<<end
cout<<fixed<<setw(54)<<left<< "1. Aces (1) = "<<setw(4)<<right<<"= "
s1==true
true
cout<<t1<<endl
false
cout<<player1[0]<<" LOCKED"<<end
cout<<fixed<<setw(54)<<left<< "12. Yahtzee!= 50 Points = "<<setw(4)<<right<<"= "
s12==true
true
cout<<t12<<endl
false
cout<<player1[11]<<" LOCKED"<<end
cout<<fixed<<setw(54)<<left<< "13. Chance = "<<setw(4)<<right<<"= "
s13==true
true
cout<<t14<<endl
false
cout<<player1[14]<<" LOCKED"<<end
AC

- After calculating each possible score, the program then shows the player which scores they have not “LOCKED” yet. When the code loops, one or more of these values will display “LOCKED” signifying that value is saved.



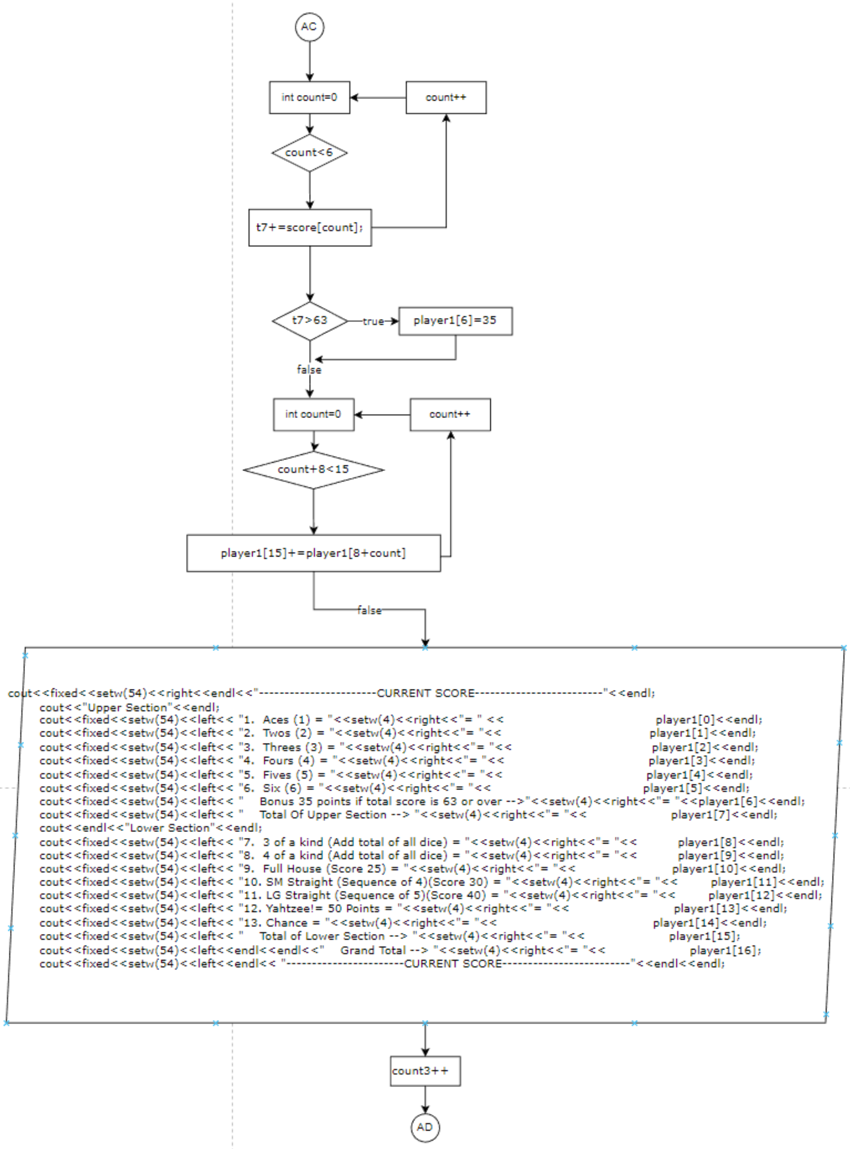


```
score[0]=  t1;       //Aces
score[1]=  t2;       //Twos
score[2]=  t3;       //Threes
score[3]=  t4;       //Fours
score[4]=  t5;       //Fives
score[5]=  t6;       //Sixes
score[6]=  bonus;     //Bonus 35 if over 63 above
score[7]=  t12;      //Total of upper section
score[8]=  t8;       //3 of a kind
score[9]=  t9;       //4 of a kind
score[10]=  t10;     //Full house
score[11]=  smstr;    //Small Straight
score[12]=  lgstr;   //Large Straight
score[13]=  Yahtzee;  //Yahtzee
score[14]=  t14;      //Chance
score[15]=  t11;      //Total of lower section
score[16]=  fin;     //Grand total
```

- All scores earned this round are then applied to a temporary array.

- The program then takes an input from the player. Based on that input, the relevant score is then set to false and that value is then transferred from the temporary array to that player's array.

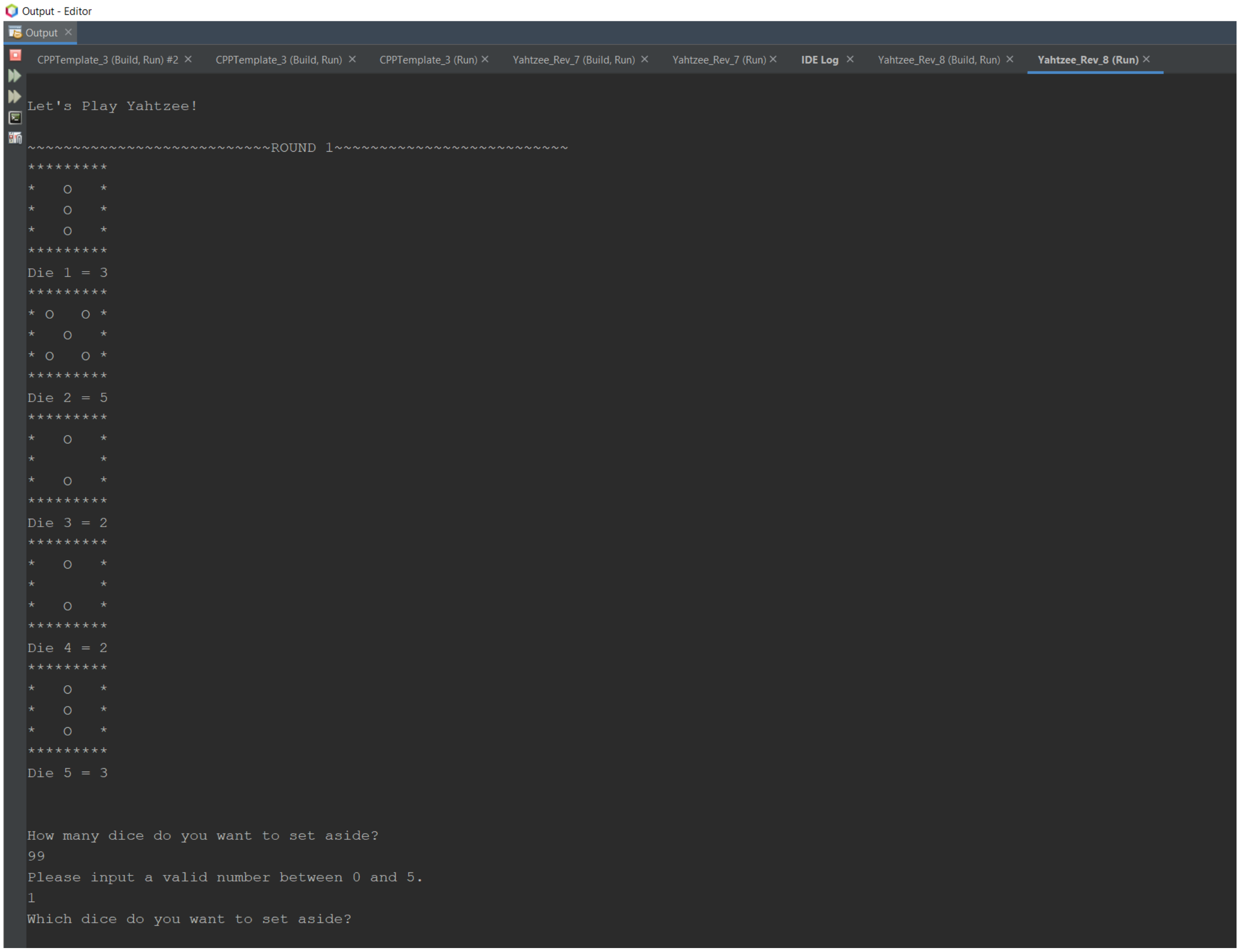
- The final scoring is added where the program checks to see if the upper group of values are greater than 63. If true, then the player gains an extra 35 points. The lower scores are added together and the program outputs all scores saved in that player’s array.



```
cout<<fixed<<setw(54)<<right<<endl<<"----------------------CURRENT SCORE------------------------"<<endl;
    cout<<"Upper Section"<<endl;
    cout<<fixed<<setw(54)<<left<< "1.  Aces (1) = "<<setw(4)<<right<<"= " <<                              player1[0]<<endl;
    cout<<fixed<<setw(54)<<left<< "2.  Twos (2) = "<<setw(4)<<right<<"= "<<                              player1[1]<<endl;
    cout<<fixed<<setw(54)<<left<< "3.  Threes (3) = "<<setw(4)<<right<<"= "<<                             player1[2]<<endl;
    cout<<fixed<<setw(54)<<left<< "4.  Fours (4) = "<<setw(4)<<right<<"= "<<                             player1[3]<<endl;
    cout<<fixed<<setw(54)<<left<< "5.  Fives (5) = "<<setw(4)<<right<<"= "<<                             player1[4]<<endl;
    cout<<fixed<<setw(54)<<left<< "6.  Six (6) = "<<setw(4)<<right<<"= "<<                              player1[5]<<endl;
    cout<<fixed<<setw(54)<<left<< "    Bonus 35 points if total score is 63 or over -->"<<setw(4)<<right<<"= "<<player1[6]<<endl;
    cout<<fixed<<setw(54)<<left<< "    Total Of Upper Section --> "<<setw(4)<<right<<"= "<<                  player1[7]<<endl;
    cout<<endl<<"Lower Section"<<endl;
    cout<<fixed<<setw(54)<<left<< "7.  3 of a kind (Add total of all dice) = "<<setw(4)<<right<<"= "<<        player1[8]<<endl;
    cout<<fixed<<setw(54)<<left<< "8.  4 of a kind (Add total of all dice) = "<<setw(4)<<right<<"= "<<        player1[9]<<endl;
    cout<<fixed<<setw(54)<<left<< "9.  Full House (Score 25) = "<<setw(4)<<right<<"= "<<                   player1[10]<<endl;
    cout<<fixed<<setw(54)<<left<< "10. SM Straight (Sequence of 4)(Score 30) = "<<setw(4)<<right<<"= "<<       player1[11]<<endl;
    cout<<fixed<<setw(54)<<left<< "11. LG Straight (Sequence of 5)(Score 40) = "<<setw(4)<<right<<"= "<<       player1[12]<<endl;
    cout<<fixed<<setw(54)<<left<< "12. Yahtzee!= 50 Points = "<<setw(4)<<right<<"= "<<                    player1[13]<<endl;
    cout<<fixed<<setw(54)<<left<< "13. Chance = "<<setw(4)<<right<<"= "<<                               player1[14]<<endl;
    cout<<fixed<<setw(54)<<left<< "    Total of Lower Section --> "<<setw(4)<<right<<"= "<<                  player1[15];
    cout<<fixed<<setw(54)<<left<<endl<<endl<<"    Grand Total --> "<<setw(4)<<right<<"= "<<                  player1[16];
    cout<<fixed<<setw(54)<<left<<endl<< "----------------------CURRENT SCORE------------------------"<<endl<<endl;
```

- The program then loops back at “AC” and repeats until all 13 turns are completed.

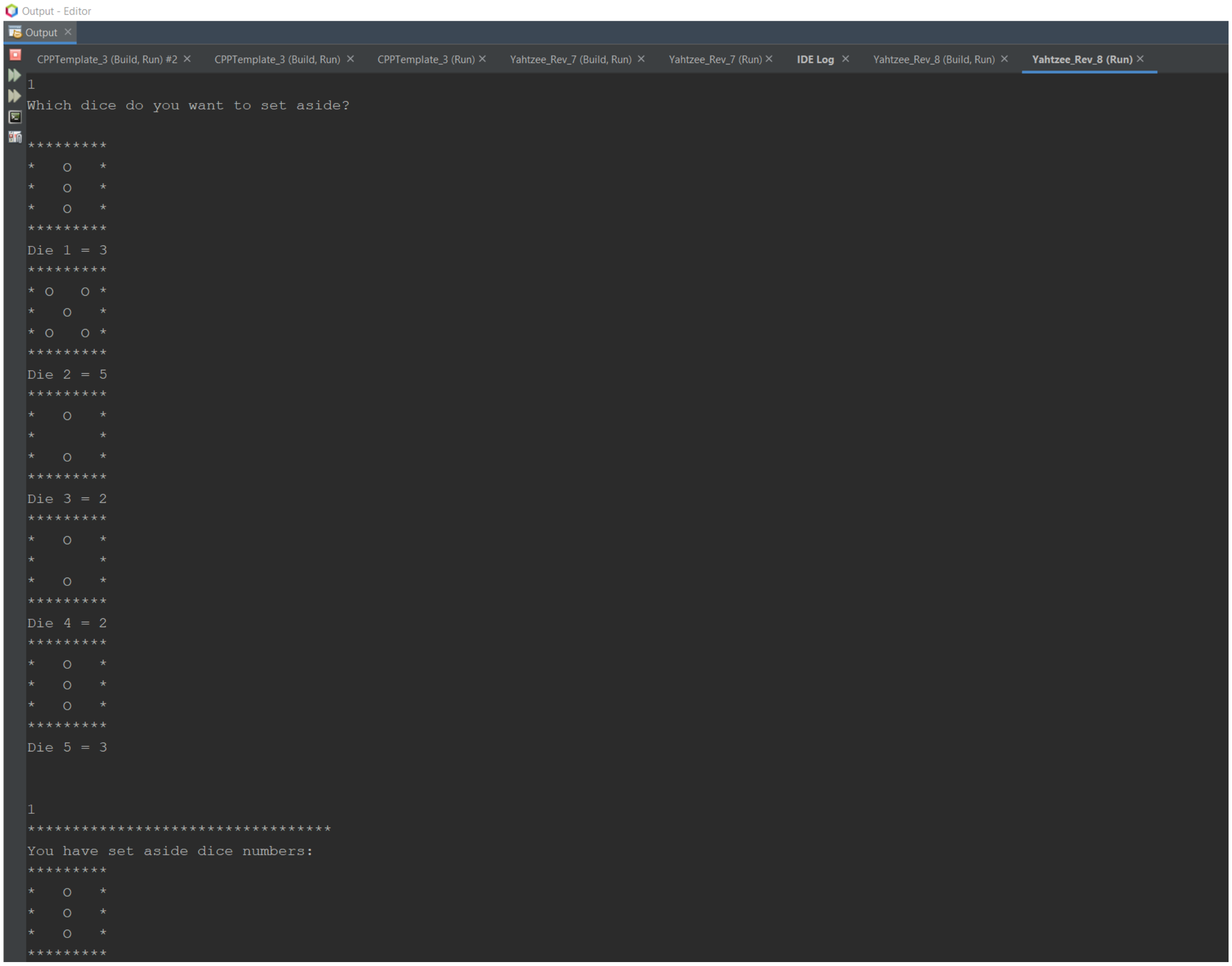
8. Proof of a Working Project


Output - Editor
Output
CPPTemplate_3 (Build, Run) #2
CPPTemplate_3 (Build, Run)
CPPTemplate_3 (Run)
Yahtzee_Rev_7 (Build, Run)
Yahtzee_Rev_7 (Run)
IDE Log
Yahtzee_Rev_8 (Build, Run)
Yahtzee_Rev_8 (Run)

```
Let's Play Yahtzee!

~~~~~~~~~~~~~~~~~~~~~~~~~~~ROUND 1~~~~~~~~~~~~~~~~~~~~~~~~~~
*********
*   O   *
*   O   *
*   O   *
*********
Die 1 = 3
*********
* O   O *
*   O   *
* O   O *
*********
Die 2 = 5
*********
*   O   *
*       *
*   O   *
*********
Die 3 = 2
*********
*   O   *
*       *
*   O   *
*********
Die 4 = 2
*********
*   O   *
*   O   *
*   O   *
*********
Die 5 = 3

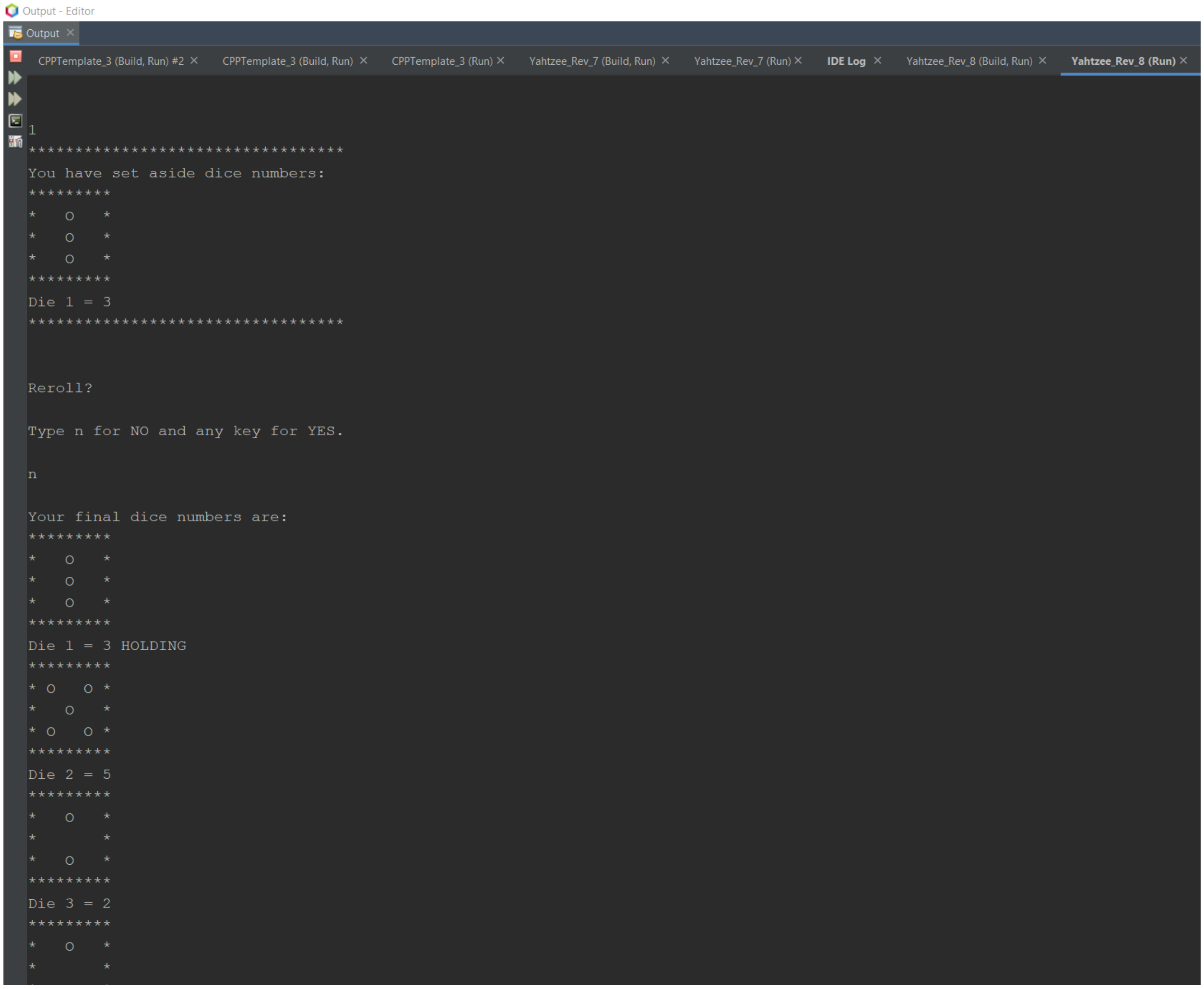

How many dice do you want to set aside?
99
Please input a valid number between 0 and 5.
1
Which dice do you want to set aside?
```


Output - Editor
Output
CPPTemplate_3 (Build, Run) #2
CPPTemplate_3 (Build, Run)
CPPTemplate_3 (Run)
Yahtzee_Rev_7 (Build, Run)
Yahtzee_Rev_7 (Run)
IDE Log
Yahtzee_Rev_8 (Build, Run)
Yahtzee_Rev_8 (Run)

```
1
Which dice do you want to set aside?

*********
*   O   *
*   O   *
*   O   *
*********
Die 1 = 3
*********
* O   O *
*   O   *
* O   O *
*********
Die 2 = 5
*********
*   O   *
*       *
*   O   *
*********
Die 3 = 2
*********
*   O   *
*       *
*   O   *
*********
Die 4 = 2
*********
*   O   *
*   O   *
*   O   *
*********
Die 5 = 3


1
**********************************
You have set aside dice numbers:
*********
*   O   *
*   O   *
*   O   *
*********
```



Output - Editor
Output
CPPTemplate_3 (Build, Run) #2
CPPTemplate_3 (Build, Run)
CPPTemplate_3 (Run)
Yahtzee_Rev_7 (Build, Run)
Yahtzee_Rev_7 (Run)
IDE Log
Yahtzee_Rev_8 (Build, Run)
Yahtzee_Rev_8 (Run)

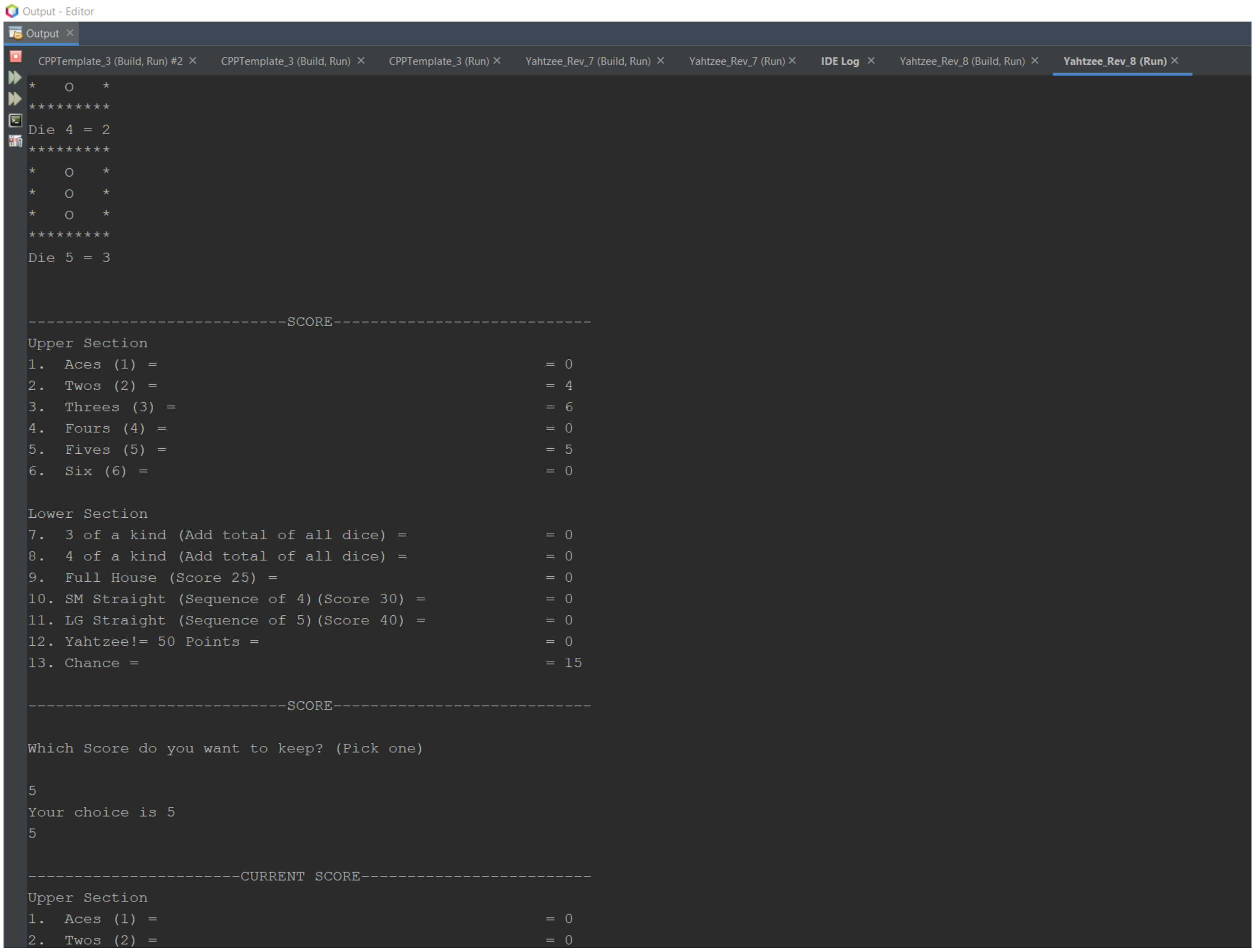
```
1
**********************************
You have set aside dice numbers:
*********
*   O   *
*   O   *
*   O   *
*********
Die 1 = 3
**********************************


Reroll?

Type n for NO and any key for YES.

n

Your final dice numbers are:
*********
*   O   *
*   O   *
*   O   *
*********
Die 1 = 3 HOLDING
*********
* O   O *
*   O   *
* O   O *
*********
Die 2 = 5
*********
*   O   *
*       *
*   O   *
*********
Die 3 = 2
*********
*   O   *
*       *
```


Output - Editor
Output
CPPTemplate_3 (Build, Run) #2
CPPTemplate_3 (Build, Run)
CPPTemplate_3 (Run)
Yahtzee_Rev_7 (Build, Run)
Yahtzee_Rev_7 (Run)
IDE Log
Yahtzee_Rev_8 (Build, Run)
Yahtzee_Rev_8 (Run)

```
*   O   *
*********
Die 4 = 2
*********
*   O   *
*   O   *
*   O   *
*********
Die 5 = 3


----------------------------SCORE----------------------------
Upper Section
1.  Aces (1) =                                          = 0
2.  Twos (2) =                                          = 4
3.  Threes (3) =                                        = 6
4.  Fours (4) =                                         = 0
5.  Fives (5) =                                         = 5
6.  Six (6) =                                           = 0

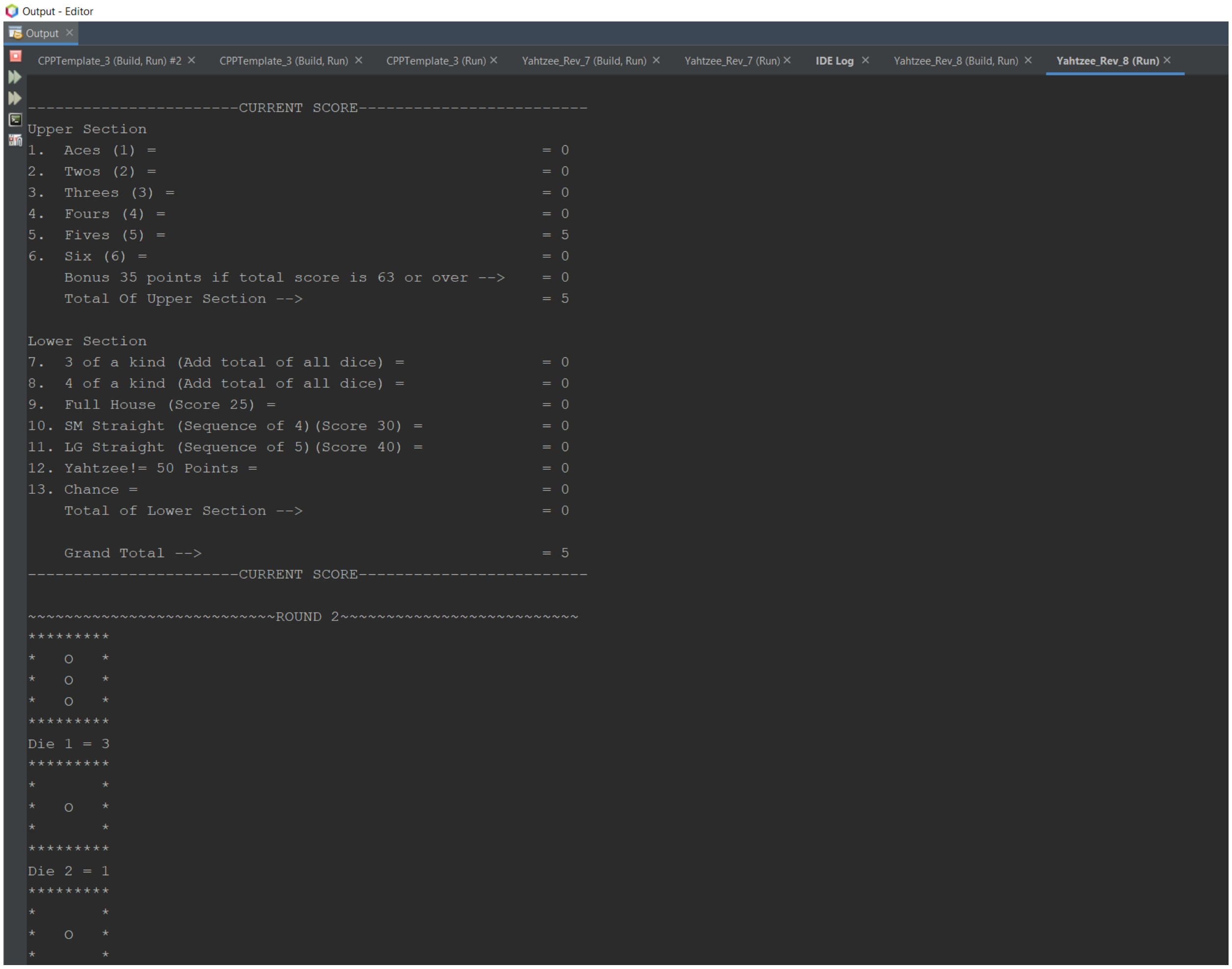
Lower Section
7.  3 of a kind (Add total of all dice) =               = 0
8.  4 of a kind (Add total of all dice) =               = 0
9.  Full House (Score 25) =                             = 0
10. SM Straight (Sequence of 4)(Score 30) =             = 0
11. LG Straight (Sequence of 5)(Score 40) =             = 0
12. Yahtzee!= 50 Points =                               = 0
13. Chance =                                            = 15

----------------------------SCORE----------------------------

Which Score do you want to keep? (Pick one)

5
Your choice is 5
5

-----------------------CURRENT SCORE-------------------------
Upper Section
1.  Aces (1) =                                          = 0
2.  Twos (2) =                                          = 0
```

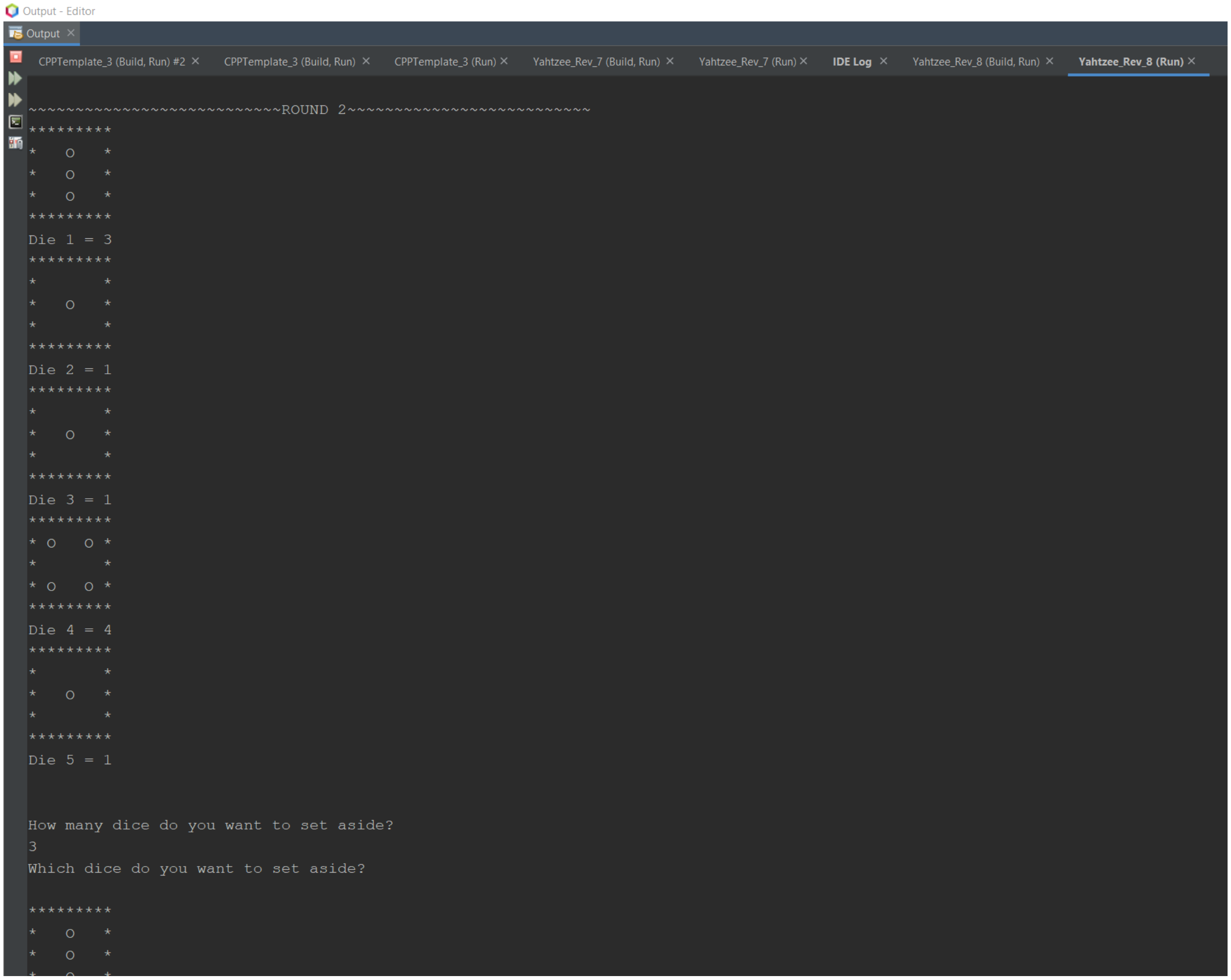

Output - Editor
Output
CPPTemplate_3 (Build, Run) #2
CPPTemplate_3 (Build, Run)
CPPTemplate_3 (Run)
Yahtzee_Rev_7 (Build, Run)
Yahtzee_Rev_7 (Run)
IDE Log
Yahtzee_Rev_8 (Build, Run)
Yahtzee_Rev_8 (Run)

```
-----------------------CURRENT SCORE-------------------------
Upper Section
1.  Aces (1) =                                          = 0
2.  Twos (2) =                                          = 0
3.  Threes (3) =                                        = 0
4.  Fours (4) =                                         = 0
5.  Fives (5) =                                         = 5
6.  Six (6) =                                           = 0
    Bonus 35 points if total score is 63 or over -->    = 0
    Total Of Upper Section -->                          = 5

Lower Section
7.  3 of a kind (Add total of all dice) =               = 0
8.  4 of a kind (Add total of all dice) =               = 0
9.  Full House (Score 25) =                             = 0
10. SM Straight (Sequence of 4)(Score 30) =             = 0
11. LG Straight (Sequence of 5)(Score 40) =             = 0
12. Yahtzee!= 50 Points =                               = 0
13. Chance =                                            = 0
    Total of Lower Section -->                          = 0

    Grand Total -->                                     = 5
-----------------------CURRENT SCORE-------------------------

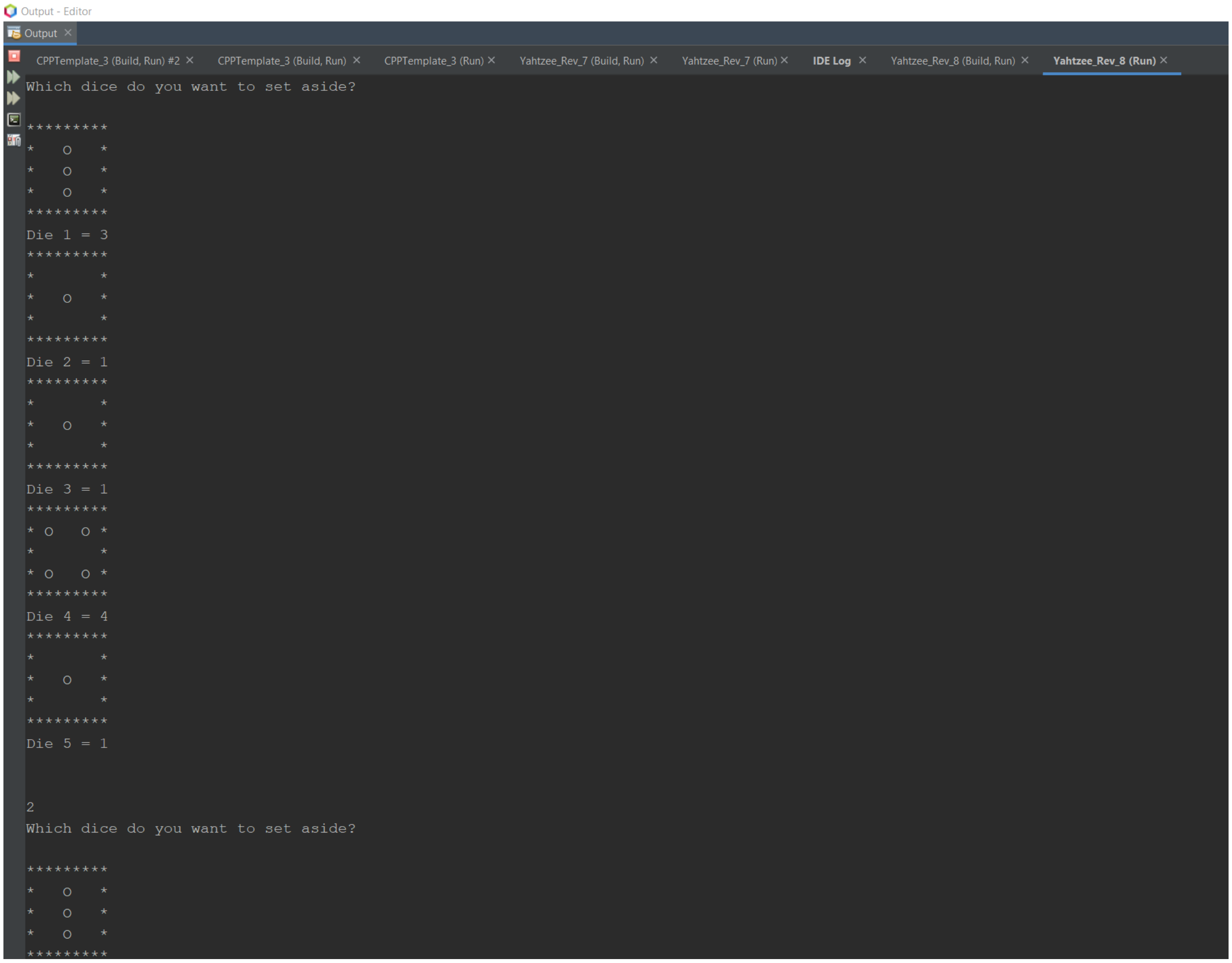
~~~~~~~~~~~~~~~~~~~~~~~~~~~ROUND 2~~~~~~~~~~~~~~~~~~~~~~~~~~
*********
*   O   *
*   O   *
*   O   *
*********
Die 1 = 3
*********
*       *
*   O   *
*       *
*********
Die 2 = 1
*********
*       *
*   O   *
*       *
```


Output - Editor
Output
CPPTemplate_3 (Build, Run) #2
CPPTemplate_3 (Build, Run)
CPPTemplate_3 (Run)
Yahtzee_Rev_7 (Build, Run)
Yahtzee_Rev_7 (Run)
IDE Log
Yahtzee_Rev_8 (Build, Run)
Yahtzee_Rev_8 (Run)

```
~~~~~~~~~~~~~~~~~~~~~~~~~~~ROUND 2~~~~~~~~~~~~~~~~~~~~~~~~~~
*********
*   O   *
*   O   *
*   O   *
*********
Die 1 = 3
*********
*       *
*   O   *
*       *
*********
Die 2 = 1
*********
*       *
*   O   *
*       *
*********
Die 3 = 1
*********
* O   O *
*       *
* O   O *
*********
Die 4 = 4
*********
*       *
*   O   *
*       *
*********
Die 5 = 1


How many dice do you want to set aside?
3
Which dice do you want to set aside?

*********
*   O   *
*   O   *
*   O   *
```

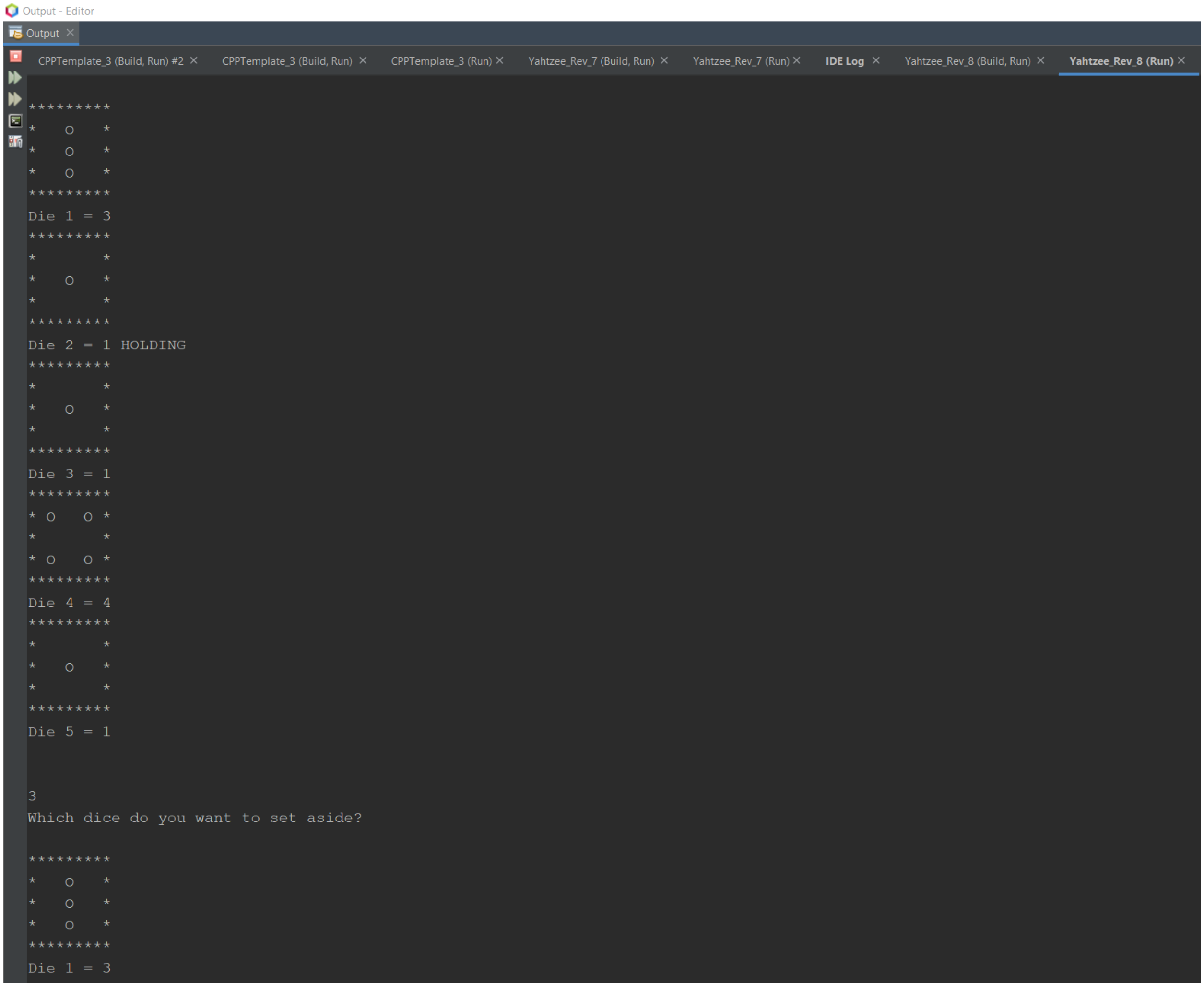

Output - Editor
Output
CPPTemplate_3 (Build, Run) #2
CPPTemplate_3 (Build, Run)
CPPTemplate_3 (Run)
Yahtzee_Rev_7 (Build, Run)
Yahtzee_Rev_7 (Run)
IDE Log
Yahtzee_Rev_8 (Build, Run)
Yahtzee_Rev_8 (Run)

```
Which dice do you want to set aside?

*********
*   o   *
*   o   *
*   o   *
*********
Die 1 = 3
*********
*       *
*   o   *
*       *
*********
Die 2 = 1
*********
*       *
*   o   *
*       *
*********
Die 3 = 1
*********
* o   o *
*       *
* o   o *
*********
Die 4 = 4
*********
*       *
*   o   *
*       *
*********
Die 5 = 1


2
Which dice do you want to set aside?

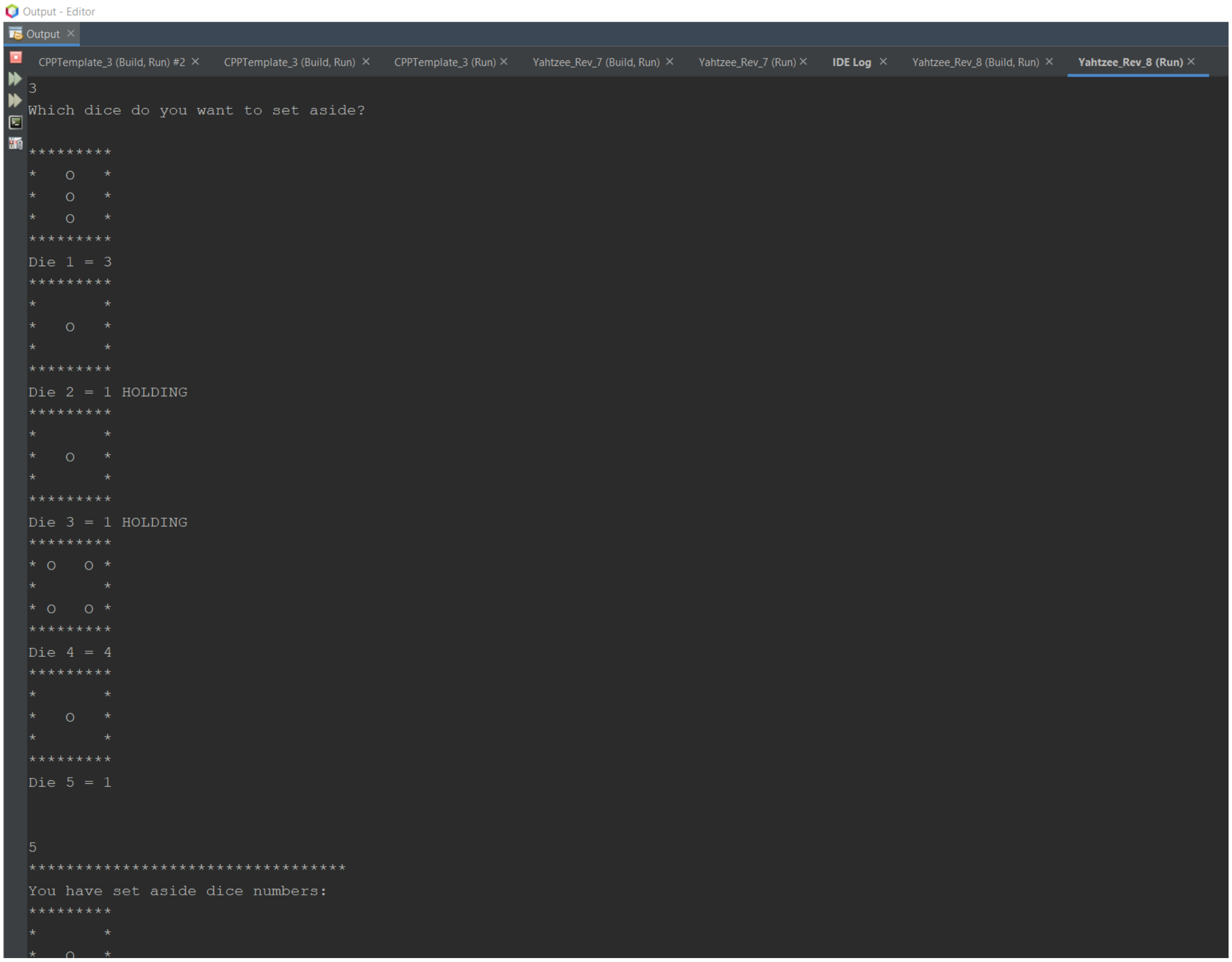
*********
*   o   *
*   o   *
*   o   *
*********
```


Output - Editor
Output
CPPTemplate_3 (Build, Run) #2
CPPTemplate_3 (Build, Run)
CPPTemplate_3 (Run)
Yahtzee_Rev_7 (Build, Run)
Yahtzee_Rev_7 (Run)
IDE Log
Yahtzee_Rev_8 (Build, Run)
Yahtzee_Rev_8 (Run)

```
*********
*   o   *
*   o   *
*   o   *
*********
Die 1 = 3
*********
*       *
*   o   *
*       *
*********
Die 2 = 1 HOLDING
*********
*       *
*   o   *
*       *
*********
Die 3 = 1
*********
* o   o *
*       *
* o   o *
*********
Die 4 = 4
*********
*       *
*   o   *
*       *
*********
Die 5 = 1


3
Which dice do you want to set aside?

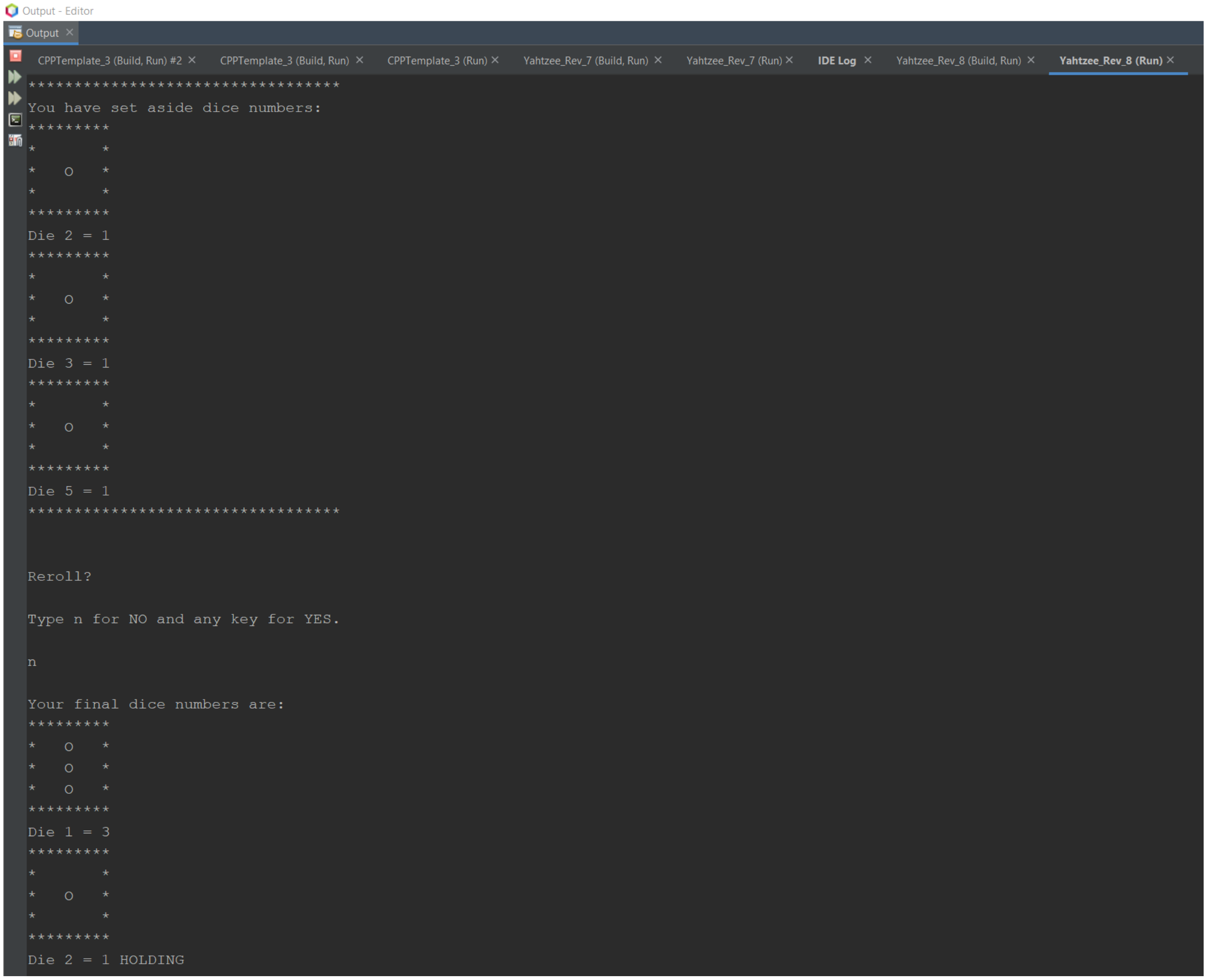
*********
*   o   *
*   o   *
*   o   *
*********
Die 1 = 3
```


Output - Editor
Output
CPPTemplate_3 (Build, Run) #2
CPPTemplate_3 (Build, Run)
CPPTemplate_3 (Run)
Yahtzee_Rev_7 (Build, Run)
Yahtzee_Rev_7 (Run)
IDE Log
Yahtzee_Rev_8 (Build, Run)
Yahtzee_Rev_8 (Run)

```
3
Which dice do you want to set aside?

*********
*   o   *
*   o   *
*   o   *
*********
Die 1 = 3
*********
*       *
*   o   *
*       *
*********
Die 2 = 1 HOLDING
*********
*       *
*   o   *
*       *
*********
Die 3 = 1 HOLDING
*********
* o   o *
*       *
* o   o *
*********
Die 4 = 4
*********
*       *
*   o   *
*       *
*********
Die 5 = 1


5
**********************************
You have set aside dice numbers:
*********
*       *
*   o   *
```



Output - Editor
Output
CPPTemplate_3 (Build, Run) #2
CPPTemplate_3 (Build, Run)
CPPTemplate_3 (Run)
Yahtzee_Rev_7 (Build, Run)
Yahtzee_Rev_7 (Run)
IDE Log
Yahtzee_Rev_8 (Build, Run)
Yahtzee_Rev_8 (Run)

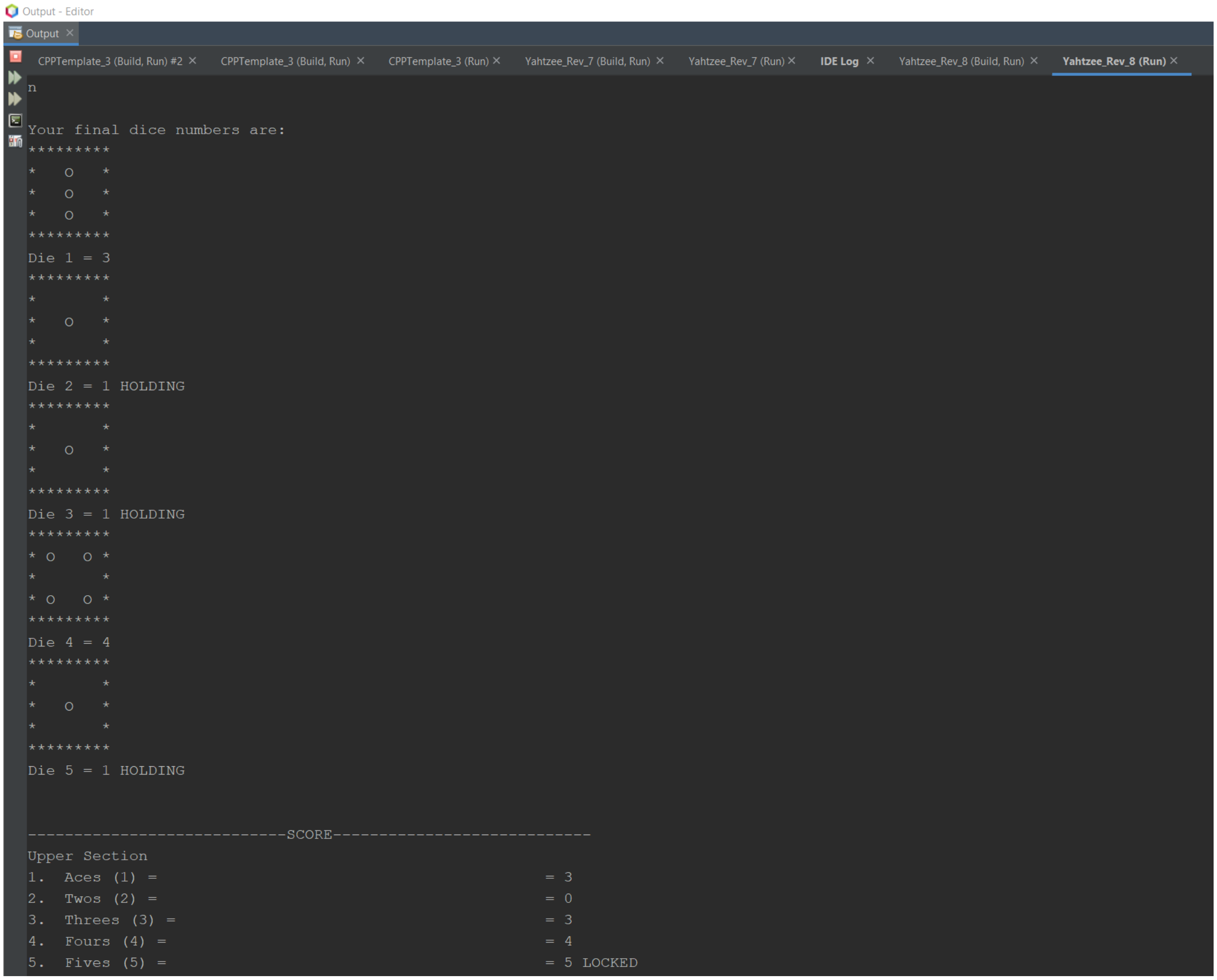
```
***********************************
You have set aside dice numbers:
*********
*       *
*   o   *
*       *
*********
Die 2 = 1
*********
*       *
*   o   *
*       *
*********
Die 3 = 1
*********
*       *
*   o   *
*       *
*********
Die 5 = 1
***********************************


Reroll?

Type n for NO and any key for YES.

n

Your final dice numbers are:
*********
*   o   *
*   o   *
*   o   *
*********
Die 1 = 3
*********
*       *
*   o   *
*       *
*********
Die 2 = 1 HOLDING
```

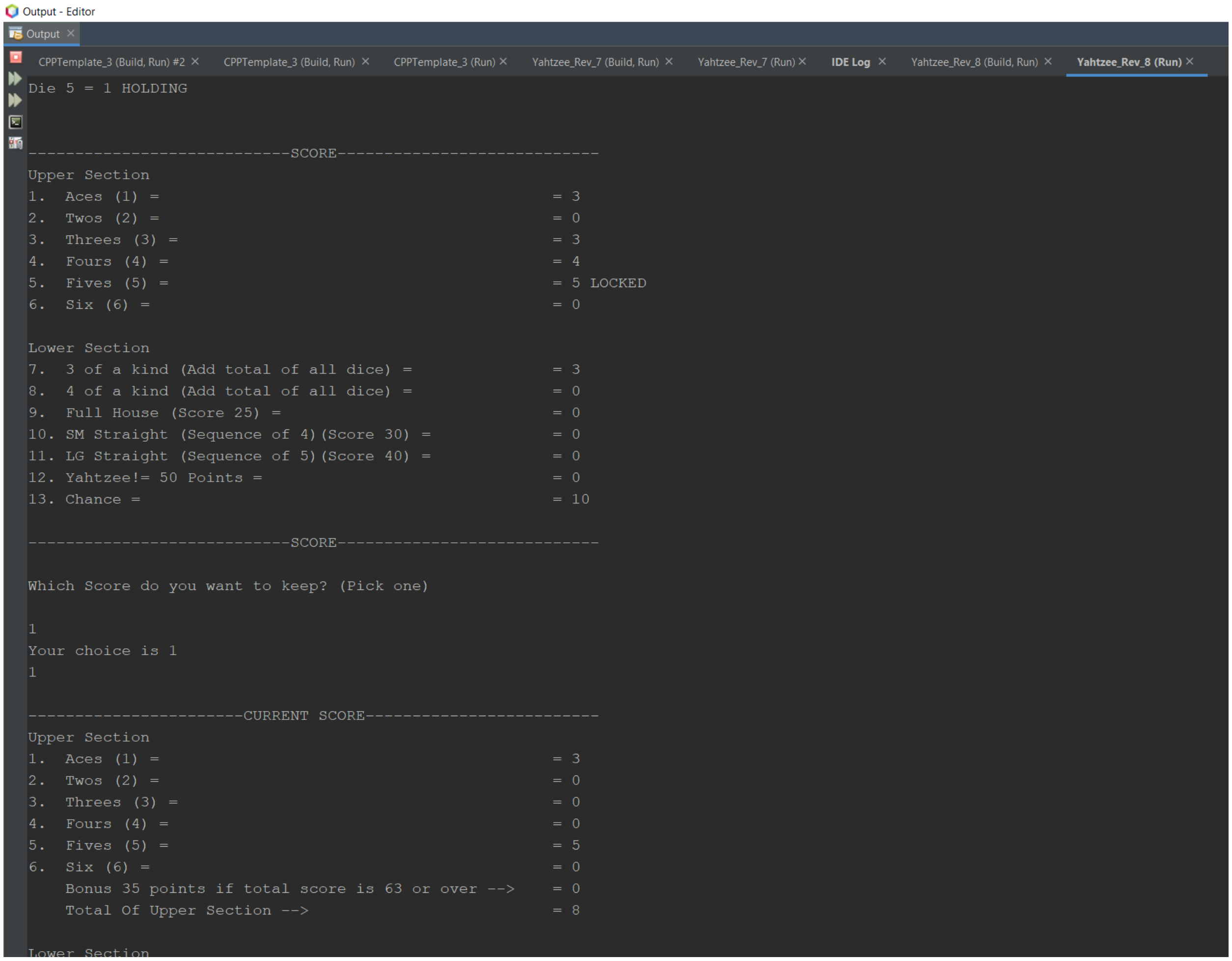


Output - Editor
Output
CPPTemplate_3 (Build, Run) #2
CPPTemplate_3 (Build, Run)
CPPTemplate_3 (Run)
Yahtzee_Rev_7 (Build, Run)
Yahtzee_Rev_7 (Run)
IDE Log
Yahtzee_Rev_8 (Build, Run)
Yahtzee_Rev_8 (Run)

```
n

Your final dice numbers are:
*********
*   o   *
*   o   *
*   o   *
*********
Die 1 = 3
*********
*       *
*   o   *
*       *
*********
Die 2 = 1 HOLDING
*********
*       *
*   o   *
*       *
*********
Die 3 = 1 HOLDING
*********
* o   o *
*       *
* o   o *
*********
Die 4 = 4
*********
*       *
*   o   *
*       *
*********
Die 5 = 1 HOLDING


----------------------------SCORE----------------------------
Upper Section
1.  Aces (1) =                                          = 3
2.  Twos (2) =                                          = 0
3.  Threes (3) =                                        = 3
4.  Fours (4) =                                         = 4
5.  Fives (5) =                                         = 5 LOCKED
```


Output - Editor
Output
CPPTemplate_3 (Build, Run) #2
CPPTemplate_3 (Build, Run)
CPPTemplate_3 (Run)
Yahtzee_Rev_7 (Build, Run)
Yahtzee_Rev_7 (Run)
IDE Log
Yahtzee_Rev_8 (Build, Run)
Yahtzee_Rev_8 (Run)

```
Die 5 = 1 HOLDING


----------------------------SCORE----------------------------
Upper Section
1.  Aces (1) =                                          = 3
2.  Twos (2) =                                          = 0
3.  Threes (3) =                                        = 3
4.  Fours (4) =                                         = 4
5.  Fives (5) =                                         = 5 LOCKED
6.  Six (6) =                                           = 0

Lower Section
7.  3 of a kind (Add total of all dice) =               = 3
8.  4 of a kind (Add total of all dice) =               = 0
9.  Full House (Score 25) =                             = 0
10. SM Straight (Sequence of 4)(Score 30) =             = 0
11. LG Straight (Sequence of 5)(Score 40) =             = 0
12. Yahtzee!= 50 Points =                               = 0
13. Chance =                                            = 10

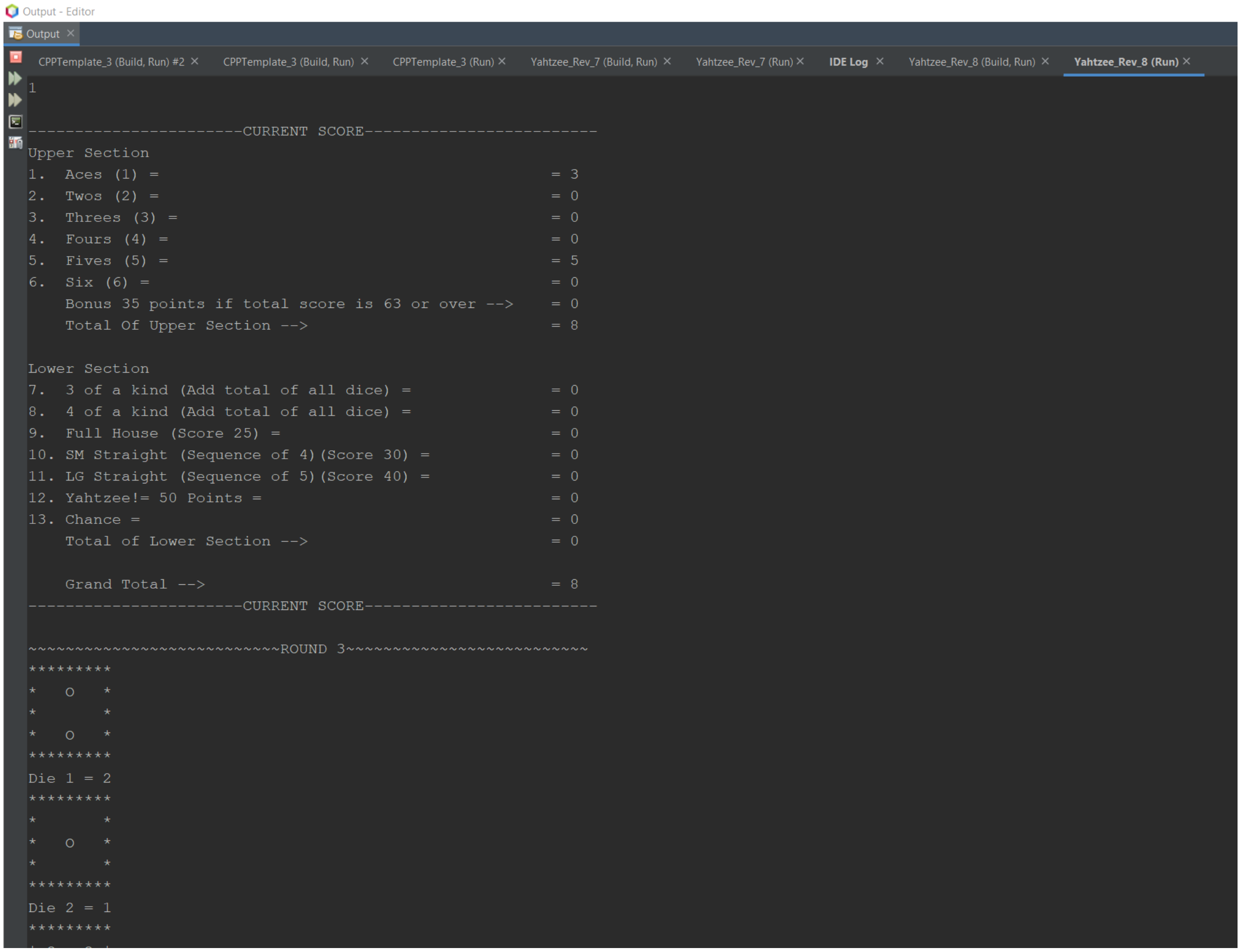
----------------------------SCORE----------------------------

Which Score do you want to keep? (Pick one)

1
Your choice is 1
1

-----------------------CURRENT SCORE-------------------------
Upper Section
1.  Aces (1) =                                          = 3
2.  Twos (2) =                                          = 0
3.  Threes (3) =                                        = 0
4.  Fours (4) =                                         = 0
5.  Fives (5) =                                         = 5
6.  Six (6) =                                           = 0
    Bonus 35 points if total score is 63 or over -->    = 0
    Total Of Upper Section -->                          = 8

Lower Section
```


Output - Editor
Output
CPPTemplate_3 (Build, Run) #2
CPPTemplate_3 (Build, Run)
CPPTemplate_3 (Run)
Yahtzee_Rev_7 (Build, Run)
Yahtzee_Rev_7 (Run)
IDE Log
Yahtzee_Rev_8 (Build, Run)
Yahtzee_Rev_8 (Run)

```
1

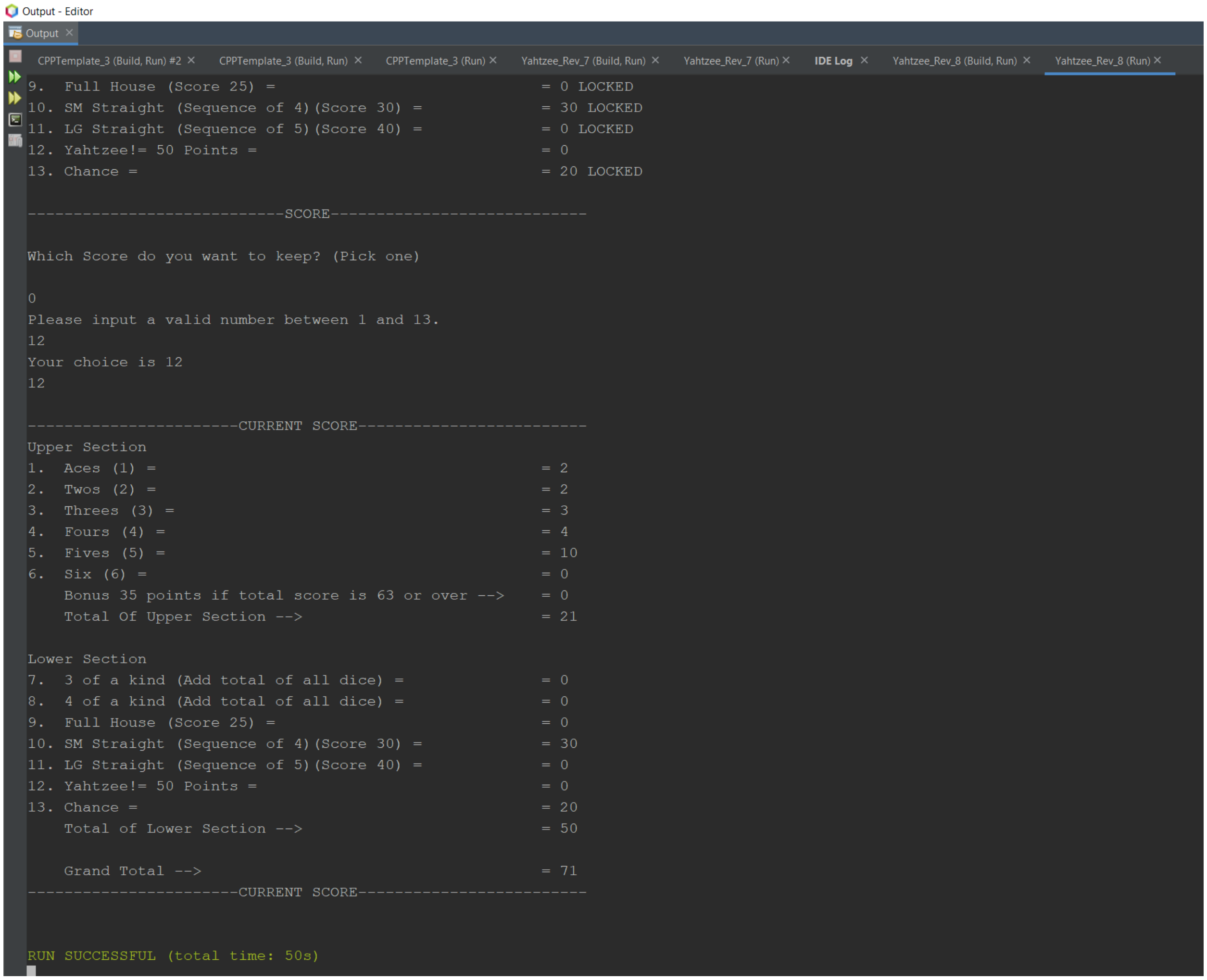
-----------------------CURRENT SCORE-------------------------
Upper Section
1.  Aces (1) =                                          = 3
2.  Twos (2) =                                          = 0
3.  Threes (3) =                                        = 0
4.  Fours (4) =                                         = 0
5.  Fives (5) =                                         = 5
6.  Six (6) =                                           = 0
    Bonus 35 points if total score is 63 or over -->    = 0
    Total Of Upper Section -->                          = 8

Lower Section
7.  3 of a kind (Add total of all dice) =               = 0
8.  4 of a kind (Add total of all dice) =               = 0
9.  Full House (Score 25) =                             = 0
10. SM Straight (Sequence of 4)(Score 30) =             = 0
11. LG Straight (Sequence of 5)(Score 40) =             = 0
12. Yahtzee!= 50 Points =                               = 0
13. Chance =                                            = 0
    Total of Lower Section -->                          = 0

    Grand Total -->                                     = 8
-----------------------CURRENT SCORE-------------------------

~~~~~~~~~~~~~~~~~~~~~~~~~~~ROUND 3~~~~~~~~~~~~~~~~~~~~~~~~~~
*********
*   O   *
*       *
*   O   *
*********
Die 1 = 2
*********
*       *
*   O   *
*       *
*********
Die 2 = 1
*********
```

The code continues for a while. I skipped to the end here.


Output - Editor
Output
CPPTemplate_3 (Build, Run) #2
CPPTemplate_3 (Build, Run)
CPPTemplate_3 (Run)
Yahtzee_Rev_7 (Build, Run)
Yahtzee_Rev_7 (Run)
IDE Log
Yahtzee_Rev_8 (Build, Run)
Yahtzee_Rev_8 (Run)

```
9.  Full House (Score 25) =                             = 0 LOCKED
10. SM Straight (Sequence of 4)(Score 30) =             = 30 LOCKED
11. LG Straight (Sequence of 5)(Score 40) =             = 0 LOCKED
12. Yahtzee!= 50 Points =                               = 0
13. Chance =                                            = 20 LOCKED

----------------------------SCORE----------------------------

Which Score do you want to keep? (Pick one)

0
Please input a valid number between 1 and 13.
12
Your choice is 12
12

-----------------------CURRENT SCORE-------------------------
Upper Section
1.  Aces (1) =                                          = 2
2.  Twos (2) =                                          = 2
3.  Threes (3) =                                        = 3
4.  Fours (4) =                                         = 4
5.  Fives (5) =                                         = 10
6.  Six (6) =                                           = 0
    Bonus 35 points if total score is 63 or over -->    = 0
    Total Of Upper Section -->                          = 21

Lower Section
7.  3 of a kind (Add total of all dice) =               = 0
8.  4 of a kind (Add total of all dice) =               = 0
9.  Full House (Score 25) =                             = 0
10. SM Straight (Sequence of 4)(Score 30) =             = 30
11. LG Straight (Sequence of 5)(Score 40) =             = 0
12. Yahtzee!= 50 Points =                               = 0
13. Chance =                                            = 20
    Total of Lower Section -->                          = 50

    Grand Total -->                                     = 71
-----------------------CURRENT SCORE-------------------------


RUN SUCCESSFUL (total time: 50s)
```

9. References

1. Dr. Lehr’s Lectures & Lab

2. “Starting Out with C++: From Control Structures through Objects” Gaddis, Tony. 8th Edition. (Textbook)

10.Program

```
/*
 * File:   main.cpp
 * Author: Jessriel Menguito
 * Created on July 25, 2022, 6:23 PM
 * Purpose: Project 1 - Yahtzee
 */
//System Libraries
#include <iostream>
#include <iomanip>
#include <cmath>
```

```
#include <cstdlib>
#include <fstream>
#include <string>
#include <ctime>
using namespace std;
//User Libraries
//Global Constants
//Mathematical/Physics/Conversions, Higher dimensioned arrays
//Function Prototypes
void dice(int,int,int,int,int,bool,bool,bool,bool,bool);
void dice2(int,int,int,int,int,bool,bool,bool,bool,bool);
void drwDie1();
void drwDie2();
void drwDie3();
void drwDie4();
void drwDie5();
void drwDie6();
void pickDie(int);
int rmvDup(int arr[], int n){
        int temp[n];
        int j = 0;
        // If current element is not equal to next element
        // then store that current element
        for (int i = 0; i < n - 1; i++)
                if (arr[i] != arr[i + 1])
                        temp[j++] = arr[i];

        // Store the last element as whether it is unique or
        // repeated, it hasn't stored previously
        temp[j++] = arr[n - 1];

        // Modify original array
        for (int i = 0; i < j; i++)
                arr[i] = temp[i];

        return j;
}
//Execution Begins Here
int main(int argc, char** argv) {

//Initialize the Random Number Seed
   srand(time(0));

//Declare Variables
   float i;
   int d1,d2,d3,d4,d5,loop=0,fin,choice,pick,points;
   int t1=0,t2=0,t3=0,t4=0,t5=0,t6=0,t7=0,t8=0,t9=0,t10=0,t11=0,t12=0,t14;
   string title;
   char yn,y,n;

   //Initialize Variables
   bool    o1=true,
         o2=true,
         o3=true,
         o4=true,
         o5=true,
         s1=true,
         s2=true,
         s3=true,
         s4=true,
         s5=true,
         s6=true,
         s7=true,
         s8=true,
         s9=true,
         s10=true,
         s11=true,
         s12=true,
         s13=true;

   const int   game=1,
            rules=2,
            turn=3,     //How many turns
            die=6;      //How many sides on a die
   int        count2=0,   //Starting number for round
            smstr=0,
            lgstr=0,
            Yahtzee=0,
            countY=0,
            bonus=0,
            count3=1,    //Starting number for number of games
            roundY=13,   //How many games
            games=20;

   //Array zeroing
   int     score[games],
         player1[games],
         player2[games];

      for (int count=0;count<games;count++){
         score[count]=0;
         player1[count]=0;
```

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            player2[count]=0;
        }
    title="Let's Play Yahtzee!";

//Map inputs to outputs -> The Process

    // Output Title
    cout<<endl<<title<<endl<<endl;

    //Output Yahtzee Score to text file
    ofstream outputFile;
    outputFile.open("YahtzeeScore.txt");

    //First Roll
    d1=rand()%die+1;
    d2=rand()%die+1;
    d3=rand()%die+1;
    d4=rand()%die+1;
    d5=rand()%die+1;

    //Game Loop
    do{

        cout<<"~~~~~~~~~~~~~~~~~~~~~~~~~~~ROUND
"<<count3<<"~~~~~~~~~~~~~~~~~~~~~~~~~~"<<endl;

        //Reset score
        for (int count=0;count<games;count++){
            score[count]=0;

        //Reset yes no
            yn=y;

        //Reset Holds
            o1=true;
            o2=true;
            o3=true;
            o4=true;
            o5=true;

        //Reset count
            count2=0;
    }
        //Turn Loop.
        do{
            //Roll dice that have bool true
```

```
int die=6;
if (o1==1){
    d1=rand()%die+1;
}
if (o2==1){
    d2=rand()%die+1;
}
if (o3==1){
    d3=rand()%die+1;
}
if (o4==1){
    d4=rand()%die+1;
}
if (o5==1){
    d5=rand()%die+1;
}

//Output dice that are not set aside
dice(d1,d2,d3,d4,d5,o1,o2,o3,o4,o5);
if (count2+1<turn){
    cout<<endl<<"How many dice do you want to set aside?"<<endl;

    //Verify valid input
    while((!(cin>>choice))||(choice<0||choice>5)){
        //Error
        cout<<"Please input a valid number between 0 and 5."<<endl;
        //Clear the previous error
        cin.clear();
        //Discard value
        cin.ignore(123, '\n');
    }

    //Which dice do you want to set aside?
    for (loop=0;loop<choice;loop++){ //Loop the dice to remove
        cout<<"Which dice do you want to set aside?"<<endl<<endl;
        dice(d1,d2,d3,d4,d5,o1,o2,o3,o4,o5);//Call dice bank
        cout<<endl;

        //Verify valid input for which die the player will pick
        while((!(cin>>pick))||(pick<0||pick>5)){
            //Error
            cout<<"Please input a valid number between 0 and 5."<<endl;
            //Clear the previous error
            cin.clear();
            //Discard value
            cin.ignore(123, '\n');
```

```
                        cout<<pick<<endl;
                        }

                    if (pick==1){//Die 1
                    o1=false;
                    }
                    if (pick==2){//Die 2
                    o2=false;
                    }
                    if (pick==3){//Die 3
                    o3=false;
                    }
                    if (pick==4){//Die 4
                    o4=false;
                    }
                    if (pick==5){//Die 5
                    o5=false;
                    }
                }

            dice2(d1,d2,d3,d4,d5,o1,o2,o3,o4,o5);   //Call dice bank 2 to show what was set
aside
            }
            //The player can end their turn here or continue rolling
            count2++;
            if (count2<turn){
                cout<<endl<<"Reroll?"<<endl<<endl;
                cout<<"Type n for NO and any key for YES."<<endl<<endl; //Ask the user if
they want a reroll
                cin>>yn;
                if (yn=='n'||yn=='N'){
                    count2=turn;
                }
            }

        }while (count2<turn);

        /*
        d1=2;
        d2=2;
        d3=2;
        d4=2;
        d5=2;
        */

        cout<<endl<<"Your final dice numbers are:"<<endl;
```

```
dice(d1,d2,d3,d4,d5,o1,o2,o3,o4,o5);




//Scoring Below
{
//Sort Dice
int number[4],a;

//Set value of each die across array
number[0]=d1;
number[1]=d2;
number[2]=d3;
number[3]=d4;
number[4]=d5;

for(int j=0; j<5; j++){
    for(int k=0; k<4; k++){
        if (number[k]>number[k+1]){
            a=number[k];
            number[k]=number[k+1];
            number[k+1]=a;
        }
    }
}
/*
for(int count=0;count<5;count++){
    cout<<"number="<<number[count]<<endl;

}
*/
//Reset scores to 0
    t1=0;
    t2=0;
    t3=0;
    t4=0;
    t5=0;
    t6=0;
    t8=0;
    t9=0;
    t10=0;
    smstr=0;
    lgstr=0;
    Yahtzee=0;
    t7=0;
    bonus=0;

//Check to see if number is equal to one. Output t1
if (d1==1||d2==1||d3==1||d4==1||d5==1){
    for (int count=0;count<5;count++){
        if (number[count]==1){
            t1+=1;
        }
    }
}
//check to see if number is equal to two. Output t2
if (d1==2||d2==2||d3==2||d4==2||d5==2){
    for (int count=0;count<5;count++){
        if (number[count]==2){
            t2+=2;
        }
    }
}
//check to see if the number is equal to three. Output t3
if (d1==3||d2==3||d3==3||d4==3||d5==3){
    for (int count=0;count<5;count++){
        if (number[count]==3){
            t3+=3;
        }
    }
}
//check to see if the number is equal to four. Output t4
if (d1==4||d2==4||d3==4||d4==4||d5==4){
    for (int count=0;count<5;count++){
        if (number[count]==4){
            t4+=4;
        }
    }
}
//check to see if the number is equal to five. Output t5
if (d1==5||d2==5||d3==5||d4==5||d5==5){
    for (int count=0;count<5;count++){
        if (number[count]==5){
            t5+=5;
        }
    }
}
//check to see if the number is equal to six. Output t6
if (d1==6||d2==6||d3==6||d4==6||d5==6){
    for (int count=0;count<5;count++){
        if (number[count]==6){
            t6+=6;
        }
    }
}
//check for three of a kind. Output t8
if (d1==d2&&d2==d3){//check triplet 1
    t8=d1+d2+d3;
}
if (d1==d2&&d2==d4){//check triplet 2
    t8=d1+d2+d4;
}
if (d1==d2&&d2==d5){//check triplet 3
    t8=d1+d2+d5;
}
if (d2==d3&&d3==d4){//check triplet 4
    t8=d2+d3+d4;
}
if (d2==d3&&d3==d5){//check triplet 5
    t8=d2+d3+d5;
}
if (d1==d4&&d4==d5){//check triplet 6
    t8=d1+d4+d5;
}
if (d2==d4&&d4==d5){//check triplet 7
    t8=d2+d4+d5;
}
if (d1==d3&&d3==d5){
    t8=d1+d3+d5;
}
if (d1==d2&&d2==d5){
    t8=d1+d2+d5;
}
if (d3==d4&&d4==d5){
    t8=d3+d4+d5;
}

//check for four of a kind. Output t9
    if (d1==d2&&d2==d3&&d2==d3&&d3==d4){//check quad 1
        t9=d1+d2+d3+d4;
    }
    else if (d1==d2&&d2==d3&&d3==d5){//check quad 2
        t9=d1+d2+d3+d5;
    }
    else if (d1==d2&&d2==d4&&d4==d5){//check quad 3
        t9=d1+d2+d4+d5;
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```
  }
  else if (d1==d3&&d3==d4&&d4==d5){//check quad 4
    t9=d1+d3+d4+d5;
  }
  else if (d2==d3&&d3==d4&&d4==d5){//check quad 5
    t9=d2+d3+d4+d5;
  }
  else
    t9=0;

//Check for a house. Check triplet then check for pair.  Output t10
  if (d1==d2&&d2==d3){
    if (d4==d5){//Check if there is a pair with the remaining
    t10=25;
    }
    else t10=0;
  }
  else if (d1==d2&&d2==d4){
    if (d3==d5){//Check if there is a pair with the remaining
    t10=25;
    }
    else t10=0;
  }
  else if (d1==d2&&d2==d5){
    if (d4==d3){//Check if there is a pair with the remaining
    t10=25;
    }
    else t10=0;
  }
  else if (d2==d3&&d3==d4){
    if (d1==d5){//Check if there is a pair with the remaining
    t10=25;
    }
    else t10=0;
  }
  else if (d2==d3&&d3==d5){
    if (d4==d1){//Check if there is a pair with the remaining
    t10=25;
    }
    else t10=0;
  }
  else if (d1==d4&&d4==d5){
    if (d2==d3){//Check if there is a pair with the remaining
    t10=25;
    }
    else t10=0;
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```
         }
         else if (d2==d4&&d4==d5){
            if (d1==d3){//Check if there is a pair with the remaining
            t10=25;
            }
            else t10=0;
         }
         else if (d1==d3&&d3==d5){
            if (d2==d4){//Check if there is a pair with the remaining
            t10=25;
            }
            else t10=0;
         }
         else if (d1==d2&&d2==d5){
            if (d3==d4){//Check if there is a pair with the remaining
            t10=25;
            }
            else t10=0;
         }
         else if (d3==d4&&d4==d5){
            if (d1==d2){//Check if there is a pair with the remaining
            t10=25;
            }
            else t10=0;
         }
            t10=0;



        int n = 5;
        // rmvDup() returns new size of array.
        n = rmvDup(number, n);
/*
        // Print updated array
        for (int i = 0; i < n; i++)
                cout << "unique="<<number[i] <<endl;
*/

      //Check for small straight. Output smstr

      if(number[0]==1&&number[1]==2&&number[2]==3&&number[3]==4)
         smstr=30;
      if(number[0]==2&&number[1]==3&&number[2]==4&&number[3]==5)
         smstr=30;
      if(number[0]==3&&number[1]==4&&number[2]==5&&number[3]==6)
         smstr=30;
        //Check for large straight. Sum of 1-5=15. Output lgstr

    if(number[0]==1&&number[1]==2&&number[2]==3&&number[3]==4&&number[4]==5)
            lgstr=40;

    if(number[0]==2&&number[1]==3&&number[2]==4&&number[3]==5&&number[4]==6)
            lgstr=40;

        //Check for Yahtzee. Output Yahtzee
        if (d1==d2&&d2==d3&&d3==d4&&d4==d5){//If all of the numbers are the same
            Yahtzee=50;
            if (countY>0){
                Yahtzee=50+(countY*100);
            }
        }
        //Sum of dice totals for Chance
        t14=d1+d2+d3+d4+d5;

        }//Scoring Above

        //Display Results

    cout<<fixed<<setw(54)<<right<<endl<<"----------------------------SCORE------------------------
    ----"<<endl;
        cout<<"Upper Section"<<endl;
        cout<<fixed<<setw(54)<<left<< "1.  Aces (1) = "<<setw(4)<<right<<"= ";
            if (s1==true){
                cout<<t1<<endl;
            }
            else{
                cout<<player1[0]<<" LOCKED"<<endl;
                    };
        cout<<fixed<<setw(54)<<left<< "2.  Twos (2) = "<<setw(4)<<right<<"= ";
            if (s2==true){
                cout<<t2<<endl;
            }
            else{
                cout<<player1[1]<<" LOCKED"<<endl;
            }
        cout<<fixed<<setw(54)<<left<< "3.  Threes (3) = "<<setw(4)<<right<<"= ";
            if (s3==true){
               cout<< t3<<endl;
            }
            else{
                cout<<player1[2]<<" LOCKED"<<endl;
            }
        cout<<fixed<<setw(54)<<left<< "4.  Fours (4) = "<<setw(4)<<right<<"= ";
            if (s4==true){
                cout<<t4<<endl;
            }
            else{
                cout<<player1[3]<<" LOCKED"<<endl;
            }
        cout<<fixed<<setw(54)<<left<< "5.  Fives (5) = "<<setw(4)<<right<<"= ";
            if (s5==true){
                cout<<t5<<endl;
            }
            else{
                cout<<player1[4]<<" LOCKED"<<endl;
            }
        cout<<fixed<<setw(54)<<left<< "6.  Six (6) = "<<setw(4)<<right<<"= ";
            if (s6==true){
                cout<<t6<<endl;
            }
            else{
                cout<<player1[5]<<" LOCKED"<<endl;
            }
        cout<<endl<<"Lower Section"<<endl;
        cout<<fixed<<setw(54)<<left<< "7.  3 of a kind (Add total of all dice) =
"<<setw(4)<<right<<"= ";
            if (s7==true){
                cout<<t8<<endl;
            }
            else{
                cout<<player1[8]<<" LOCKED"<<endl;
            }
        cout<<fixed<<setw(54)<<left<< "8.  4 of a kind (Add total of all dice) =
"<<setw(4)<<right<<"= ";
            if (s8==true){
                cout<<t9<<endl;
            }
            else{
                cout<<player1[9]<<" LOCKED"<<endl;
            }
        cout<<fixed<<setw(54)<<left<< "9.  Full House (Score 25) = "<<setw(4)<<right<<"=
";
            if (s9==true){
                cout<<t10<<endl;
            }
            else{
                cout<<player1[10]<<" LOCKED"<<endl;
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      }
    cout<<fixed<<setw(54)<<left<< "10. SM Straight (Sequence of 4)(Score 30) = 
"<<setw(4)<<right<<"= ";
      if (s10==true){
        cout<<smstr<<endl;
      }
      else{
        cout<<player1[11]<<" LOCKED"<<endl;
      }
    cout<<fixed<<setw(54)<<left<< "11. LG Straight (Sequence of 5)(Score 40) = 
"<<setw(4)<<right<<"= ";
      if (s11==true){
        cout<<lgstr<<endl;
      }
      else{
        cout<<player1[12]<<" LOCKED"<<endl;
      }
    cout<<fixed<<setw(54)<<left<< "12. Yahtzee!= 50 Points = "<<setw(4)<<right<<"=
";
      if (s12==true){
        cout<<Yahtzee<<endl;
      }
      else{
        cout<<"100 x"<<countY<<endl;
      }
    cout<<fixed<<setw(54)<<left<< "13. Chance = "<<setw(4)<<right<<"= ";
      if (s13==true){
        cout<<t14<<endl;
      }
      else{
        cout<<player1[14]<<" LOCKED"<<endl;
      }
    cout<<fixed<<setw(54)<<left<<endl<<
"---------------------------SCORE---------------------------"<<endl<<endl;


    //Set results to temporary array
    score[0]=   t1;       //Aces
    score[1]=   t2;       //Twos
    score[2]=   t3;       //Threes
    score[3]=   t4;       //Fours
    score[4]=   t5;       //Fives
    score[5]=   t6;       //Sixes
    score[6]=   bonus;    //Bonus 35 if over 63 above
    score[7]=   t12;      //Total of upper section
    score[8]=   t8;       //3 of a kind
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score[9]=   t9;        //4 of a kind
score[10]=  t10;      //Full house
score[11]=  smstr;    //Small Straight
score[12]=  lgstr;    //Large Straight
score[13]=  Yahtzee;  //Yahtzee
score[14]=  t14;      //Chance
score[15]=  t11;      //Total of lower section
score[16]=  fin;      //Grand total

//Player picks which score to keep
cout<<"Which Score do you want to keep? (Pick one)"<<endl<<endl;

//Verify input

while((!(cin>>points))||(points<1||points>13)){
//Error
cout<<"Please input a valid number between 1 and 13."<<endl;
//Clear the previous error
cin.clear();
//Discard value
cin.ignore(123, '\n');
}
cout<<"Your choice is "<<points<<endl;
if (points==12){
    countY++;
}
cout<<points<<endl;
//Send players points to array to save for next game. Bool to lock score.
if (points==1){
    player1[0]=score[0];
        s1=false;
}
else if (points==2){
    player1[1]=score[1];
       s2=false;
}
else if (points==3){
    player1[2]=score[2];
       s3=false;
}
else if (points==4){
    player1[3]=score[3];
       s4=false;
}
else if (points==5){
    player1[4]=score[4];
```

```
     s5=false;
}
else if (points==6){
   player1[5]=score[5];
     s6=false;
}
else if (points==7){
   player1[8]=score[8];
     s7=false;
}
else if (points==8){
   player1[9]=score[9];
     s8=false;
}
else if (points==9){
   player1[10]=score[10];
     s9=false;
}
else if (points==10){
   player1[11]=score[11];
     s10=false;
}
else if (points==11){
   player1[12]=score[12];
     s11=false;
}
else if (points==12){
   player1[13]=score[13];
     s12=false;
}
else if (points==13){
   player1[14]=score[14];
     s13=false;
}
else
      cout<<"error"<<endl;

//Check to see if player gets bonus points
for(int count=0;count<6;count++){
   t7+=score[count];
}
if (t7>63){
   player1[6]=35;
}

//Total for upper section
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        player1 [7]=0;
        for(int count=0;count<=6;count++){
        player1[7]+=player1[count];
        }

        //Total for lower section
        player1 [15]=0;
        for(int count=0;(count+8)<15;count++){
        player1[15]+=player1[8+count];
        }

        //Grand Total
        player1[16]=player1[7]+player1[15];

        cout<<fixed<<setw(54)<<right<<endl<<"-----------------------CURRENT
SCORE-------------------------"<<endl;
        cout<<"Upper Section"<<endl;
        cout<<fixed<<setw(54)<<left<< "1.  Aces (1) = "<<setw(4)<<right<<"= " <<
player1[0]<<endl;
        cout<<fixed<<setw(54)<<left<< "2.  Twos (2) = "<<setw(4)<<right<<"= "<<
player1[1]<<endl;
        cout<<fixed<<setw(54)<<left<< "3.  Threes (3) = "<<setw(4)<<right<<"= "<<
player1[2]<<endl;
        cout<<fixed<<setw(54)<<left<< "4.  Fours (4) = "<<setw(4)<<right<<"= "<<
player1[3]<<endl;
        cout<<fixed<<setw(54)<<left<< "5.  Fives (5) = "<<setw(4)<<right<<"= "<<
player1[4]<<endl;
        cout<<fixed<<setw(54)<<left<< "6.  Six (6) = "<<setw(4)<<right<<"= "<<
player1[5]<<endl;
        cout<<fixed<<setw(54)<<left<< "    Bonus 35 points if total score is 63 or over
-->"<<setw(4)<<right<<"= "<<player1[6]<<endl;
        cout<<fixed<<setw(54)<<left<< "    Total Of Upper Section -->
"<<setw(4)<<right<<"= "<<                    player1[7]<<endl;
        cout<<endl<<"Lower Section"<<endl;
        cout<<fixed<<setw(54)<<left<< "7.  3 of a kind (Add total of all dice) =
"<<setw(4)<<right<<"= "<<          player1[8]<<endl;
        cout<<fixed<<setw(54)<<left<< "8.  4 of a kind (Add total of all dice) =
"<<setw(4)<<right<<"= "<<          player1[9]<<endl;
        cout<<fixed<<setw(54)<<left<< "9.  Full House (Score 25) = "<<setw(4)<<right<<"=
"<<                     player1[10]<<endl;
        cout<<fixed<<setw(54)<<left<< "10. SM Straight (Sequence of 4)(Score 30) =
"<<setw(4)<<right<<"= "<<        player1[11]<<endl;
        cout<<fixed<<setw(54)<<left<< "11. LG Straight (Sequence of 5)(Score 40) =
"<<setw(4)<<right<<"= "<<        player1[12]<<endl;
        cout<<fixed<<setw(54)<<left<< "12. Yahtzee!= 50 Points = "<<setw(4)<<right<<"=
"<<                      player1[13]<<endl;
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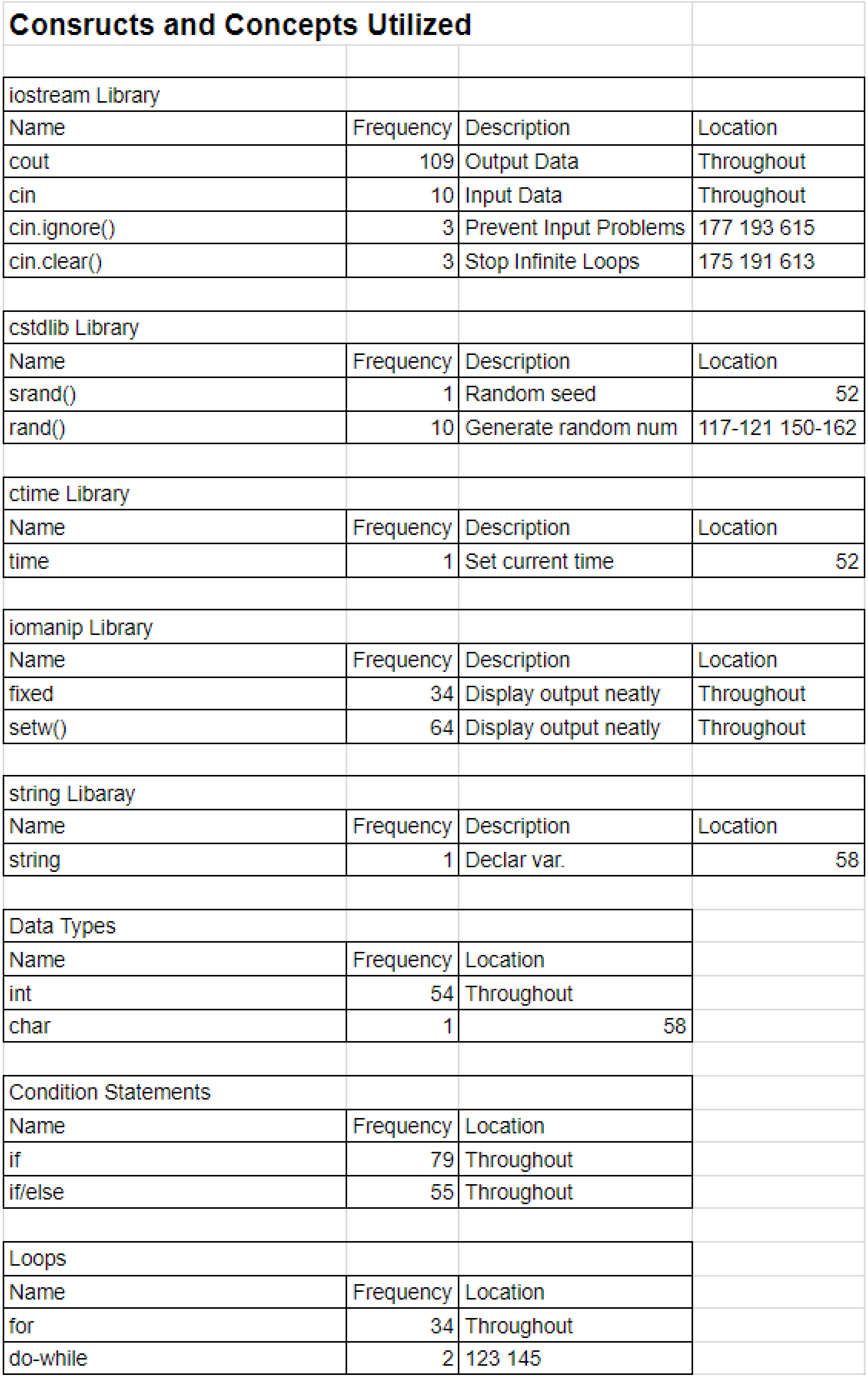
        cout<<fixed<<setw(54)<<left<< "13. Chance = "<<setw(4)<<right<<"= "<<
player1[14]<<endl;
        cout<<fixed<<setw(54)<<left<< "    Total of Lower Section -->
"<<setw(4)<<right<<"= "<<                   player1[15];
        cout<<fixed<<setw(54)<<left<<endl<<endl<<"    Grand Total -->
"<<setw(4)<<right<<"= "<<                   player1[16];
        cout<<fixed<<setw(54)<<left<<endl<< "----------------------CURRENT
SCORE------------------------"<<endl<<endl;

        count3++;
    }while (count3<=roundY);

        //Close the file
        outputFile.close();

        //Exit stage right
        return 0;
}
void dice(int d1,int d2,int d3,int d4,int d5,bool o1,bool o2,bool o3,bool o4,bool o5){
    if (o1==true){
        pickDie(d1);
        cout << "Die 1 = "<<d1<<endl;
    }
    else{
        pickDie(d1);
        cout << "Die 1 = "<<d1<<" HOLDING"<<endl;
    }
    if (o2==true){
        pickDie(d2);
        cout << "Die 2 = "<<d2<<endl;
    }
    else{
        pickDie(d2);
        cout << "Die 2 = "<<d2<<" HOLDING"<<endl;
    }
    if (o3==true){
        pickDie(d3);
        cout << "Die 3 = "<<d3<<endl;
    }
    else{
        pickDie(d3);
        cout << "Die 3 = "<<d3<<" HOLDING"<<endl;
    }
    if (o4==true){
        pickDie(d4);
        cout << "Die 4 = "<<d4<<endl;
    }
    else{
        pickDie(d4);
        cout << "Die 4 = "<<d4<<" HOLDING"<<endl;
    }
    if (o5==true){
        pickDie(d5);
        cout << "Die 5 = "<<d5<<endl;
    }
    else{
        pickDie(d5);
        cout << "Die 5 = "<<d5<<" HOLDING"<<endl;
    }

    cout<<endl;
}
void dice2(int d1,int d2,int d3,int d4,int d5,bool o1,bool o2,bool o3,bool o4,bool o5){
    cout<< "***************************************"<<endl;
    cout<<"You have set aside dice numbers:"<<endl;
    if (o1==false){
        pickDie(d1);
        cout << "Die 1 = "<<d1<<endl;
    }
    if (o2==false){
        pickDie(d2);
        cout << "Die 2 = "<<d2<<endl;
    }
    if (o3==false){
        pickDie(d3);
        cout << "Die 3 = "<<d3<<endl;
    }
    if (o4==false){
        pickDie(d4);
        cout << "Die 4 = "<<d4<<endl;
    }
    if (o5==false){
        pickDie(d5);
        cout << "Die 5 = "<<d5<<endl;
    }
    if (o5==false&&o4==false&&o3==false&&o2==false&&o1==false)
        cout<< "No numbers set aside."<<endl;
    cout<< "***************************************"<<endl;
    cout<<endl;
}
void pickDie(int x){
    if (x==1){
        cout    << "*********\n"
                << "*       *\n"
                << "*   O   *\n"
                << "*       *\n"
                << "*********\n";
    }
    if (x==2){
        cout    << "*********\n"
                << "*   O   *\n"
                << "*       *\n"
                << "*   O   *\n"
                << "*********\n";
    }
    if (x==3){
        cout    << "*********\n"
                << "*   O   *\n"
                << "*   O   *\n"
                << "*   O   *\n"
                << "*********\n";
    }
    if (x==4){
            cout    << "*********\n"
                    << "* O   O *\n"
                    << "*       *\n"
                    << "* O   O *\n"
                    << "*********\n";
    }
    if (x==5){
            cout    << "*********\n"
                    << "* O   O *\n"
                    << "*   O   *\n"
                    << "* O   O *\n"
                    << "*********\n";
    }
    if (x==6){
            cout    << "*********\n"
                    << "* O   O *\n"
                    << "* O   O *\n"
                    << "* O   O *\n"
                    << "*********\n";
    }
}
```



Consructs and Concepts Utilized

iostream Library			
Name	Frequency	Description	Location
cout	109	Output Data	Throughout
cin	10	Input Data	Throughout
cin.ignore()	3	Prevent Input Problems	177 193 615
cin.clear()	3	Stop Infinite Loops	175 191 613

cstdlib Library			
Name	Frequency	Description	Location
srand()	1	Random seed	52
rand()	10	Generate random num	117-121 150-162

ctime Library			
Name	Frequency	Description	Location
time	1	Set current time	52

iomanip Library			
Name	Frequency	Description	Location
fixed	34	Display output neatly	Throughout
setw()	64	Display output neatly	Throughout

string Libaray			
Name	Frequency	Description	Location
string	1	Declar var.	58

Data Types		
Name	Frequency	Location
int	54	Throughout
char	1	58

Condition Statements		
Name	Frequency	Location
if	79	Throughout
if/else	55	Throughout

Loops		
Name	Frequency	Location
for	34	Throughout
do-while	2	123 145