Yatzy Projct

Introduction to Programming

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Computer Science and Media Technology

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1 Introduction

The project this year is the dice game Yatzy (with Swedish rules). In groups of two, you are to create a text-based version of the game using Python and Jupyter. This document is a short addition to the lecture on the project and contains the same information.

1.1 Rules

Yatzy is a dice game where the goal is to score the highest number of points by rolling five dice to match certain combinations. Players take turns, and each player can roll the dice up to three times per turn to achieve a scoring combination. The game is played with five dice and a score sheet that contains various categories for scoring. The objective is to fill out all categories on the score sheet by rolling dice and matching them to the categories. The player with the highest total score at the end of the game wins.

1.2 Gameplay

The overall gameplay consists of a player doing two things, rolling the dice and selecting a category to place the finished roll on.

   1. Rolling Dice

Each player rolls five dice. On each turn, the player can roll the dice up to three times, but after the first roll, they may choose to keep or "hold" any of the dice and re-roll the others. This can be repeated up to two more times, with the player choosing to hold or roll different dice each time.

   2. Choosing a Category

After the third roll (or earlier if the player is satisfied), the player must select a scoring category to record their score for that turn. Once a category has been chosen and filled, it cannot be used again.

1.3 Scoring Sheet

The scoring sheet consists of two parts, the **upper section** and the **lower section**.

1.3.1 Upper Section:

In this section, the goal is to get as many of each die face (1-6) as possible. The score for each category is the sum of the dice showing that number.

   • Ones (1): Sum of all dice showing 1.
   • Twos (2): Sum of all dice showing 2.
   • Threes (3): Sum of all dice showing 3.
   • Fours (4): Sum of all dice showing 4.
   • Fives (5): Sum of all dice showing 5.
   • Sixes (6): Sum of all dice showing 6.

Bonus: If the total score in the Upper Section is 63 points or more, the player earns a 50-point bonus.

   Example: You roll: 2, 4, 4, 6, 4. You choose the "Fours" category: The score is 4 + 4 + 4 = 12.

1.3.2 Lower Section

In this section, the scores come from specific combinations of dice.

- One Pair: Two dice showing the same number.
  - Score: Sum of the two dice.
  - Example: Roll: 3, 5, 3, 6, 4.
  - Choose One Pair: Score is 3 + 3 = 6.
- Two Pairs: Two pairs of dice showing the same number.
  - Score: Sum of all four dice.
  - Example: Roll: 4, 4, 6, 6, 2.
  - Choose Two Pairs: Score is 4 + 4 + 6 + 6 = 20.
- Three of a Kind: Three dice showing the same number.
  - Score: Sum of the three dice.
  - Example: Roll: 5, 5, 5, 2, 6.
  - Choose Three of a Kind: Score is 5 + 5 + 5 = 15.
- Four of a Kind: Four dice showing the same number.
  - Score: Sum of the four dice.
  - Example: Roll: 2, 2, 2, 2, 6.
  - Choose Four of a Kind: Score is 2 + 2 + 2 + 2 = 8.
- Small Straight: A sequence of five consecutive numbers (1-2-3-4-5).
  - Score: 15 points.
  - Example: Roll: 1, 2, 3, 4, 5.
  - Choose Small Straight: Score is 15.
- Large Straight: A sequence of five consecutive numbers (2-3-4-5-6).
  - Score: 20 points.
  - Example: Roll: 2, 3, 4, 5, 6.
  - Choose Large Straight: Score is 20.
- Full House: A combination of Three of a Kind and One Pair.
  - Score: Sum of all five dice.
  - Example: Roll: 3, 3, 3, 6, 6.
  - Choose Full House: Score is 3 + 3 + 3 + 6 + 6 = 21.
- Chance: Any combination of dice.
  - Score: Sum of all five dice.
  - Example: Roll: 2, 3, 6, 4, 5.
  - Choose Chance: Score is 2 + 3 + 6 + 4 + 5 = 20.
- Yatzy (Five of a Kind): All five dice show the same number.
  - Score: 50 points.
  - Example: Roll: 6, 6, 6, 6, 6. Choose Yatzy: Score is 50.

1.4 Winning the Game

Once all players have filled in every category, the scores are totaled. The player with the highest total score, including any bonuses, wins the game. The highest possible score is 375 points. Anything over 300 is considered a good score while a "normal" score is somewhere between 150 and 250

2 Requirements for Grades

Requirements for All Grades
- For the grade E and above, the following needs to be done:
  - A **one player** game of Yatzy
  - Text-based user interface that guides the user
  - The possibility of showing the scorecard to the player
  - When rolling, guiding the user to what can be done
    - That is, ask which of the dice to hold
    - Also show what possible positions the dice can be put at
- Requirements for Grade C
  - All of the previous ones, but also:
    - Support for two or more players in the game
    - High score list of all played games that are written to a file and loaded when the game starts
      - Should of course show the highest score on top
- Requirements for Grade A
  - All of the previous ones, but also:
    - Error handling for all input
    - Something that will "amaze" us 😆
  - It is also possible to implement the somewhat larger Yatzy game called *Maxi Yatzy* for grade A
    - You will need to find the rules yourselves, but they are available on the internet
- Requirements for Grades D and B
  - For grades D or B you need to implement *something* from the higher grades
    - For example, a grade E with error handling can give a D
  - The *code quality* is also a factor for a higher (or lower) grade
    - A solution for grade C but with very nice coding could give a B
    - Likewise, a solution for grade C with very poor coding quality could give a D
  - You should, when handing in the project, state what grade you are striving for

3 Example Execution

The following is just an example of what running the program could look like. In this instance, only one player is available and only two turns are shown.

```
Rolling dice...
Roll #1: [5, 5, 4, 4, 3]
Current dice: [5, 5, 4, 4, 3]
Enter the indexes (1-5) of the dice you want to re-roll, separated by spaces
(or press enter to keep all):
Roll #2: [5, 5, 4, 4, 3]
Current dice: [5, 5, 4, 4, 3]
```

```
Enter the indexes (1-5) of the dice you want to re-roll, separated by spaces
(or press enter to keep all):
Final dice: [5, 5, 4, 4, 3]

Current score sheet:
Ones: -
Twos: -
Threes: -
Fours: -
Fives: -
Sixes: -
One Pair: -
Two Pairs: -
Three of a Kind: -
Four of a Kind: -
Small Straight: -
Large Straight: -
Full House: -
Chance: -
Yatzy: -

Possible categories for this roll:
1. Threes
2. Fours
3. Fives
4. One Pair
5. Two Pairs
6. Chance
Choose a category by number, or type 'x' to cross out a category:  5
Scored 18 points in Two Pairs.


Rolling dice...
Roll #1: [3, 1, 3, 4, 1]
Current dice: [3, 1, 3, 4, 1]
Enter the indexes (1-5) of the dice you want to re-roll, separated by spaces
(or press enter to keep all):  2 4 5
Roll #2: [3, 2, 3, 1, 3]
Current dice: [3, 2, 3, 1, 3]
Enter the indexes (1-5) of the dice you want to re-roll, separated by spaces
(or press enter to keep all):  2 4
Final dice: [3, 4, 3, 6, 3]

Current score sheet:
Ones: -
Twos: -
Threes: -
Fours: -
Fives: -
Sixes: -
```

```
One Pair: -
Two Pairs: 18
Three of a Kind: -
Four of a Kind: -
Small Straight: -
Large Straight: -
Full House: -
Chance: -
Yatzy: -

Possible categories for this roll:
1. Threes
2. Fours
3. Sixes
4. One Pair
5. Three of a Kind
6. Chance
Choose a category by number, or type 'x' to cross out a category:  1
Scored 9 points in Threes.


Rolling dice...
Roll #1: [5, 5, 1, 1, 4]
Current dice: [5, 5, 1, 1, 4]
Enter the indexes (1-5) of the dice you want to re-roll, separated by spaces
(or press enter to keep all):
```

4 Written Report

You may write the report using any kind of program, but the file you hand in *must* be a PDF. The report should contain the following information:

1. Members of the group, programme(s), date of submission
2. The grade you are striving for (E - A)
3. Introduction with a presentation of the project (200 - 300 words)
4. Discussion on how you solved the different parts for the grade.
   - How was rolling and re-rolling solved?
   - If several players, how was that solved?
   - How was the scoreboard shown?
   - How did you decide what categories were possible?
   - Reading and writing files?
   - Anything else that required a bit of thought
5. Lessons learned
   - Project related (working in groups)
   - Technical issues
6. Project work
   - Describe how your team organised the work
   - How did you communicate?

- How often did you communicate?
- How did you divide the work?
- Estimate the number of hours worked on the project for each member

The different parts above are not set in stone, but the information needs to be available in the report. Estimate the final report to be three to five A4 pages long in total.

4.1 Code Comments

Do not forget to comment your code! This is part of the written report as well and the parts of the code that are not directly understandable should be commented on. Comment all functions by creating a comment immediately above the function signature.
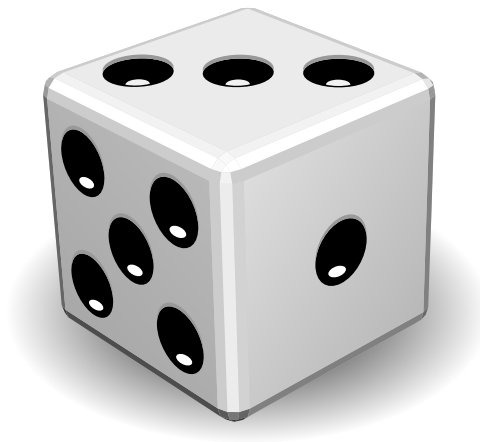
5 Scoreboard

Below you can see an example scoreboard (scoresheet) for the game.

YATZY	
Upper Section	
Ones	
Twos	
Threes	
Fours	
Fives	
Sixes	
Sum	
Bonus (63+)	
Lower Section	
One Pair	
Two Pairs	
Three of a Kind	
Four of a Kind	
Small Straight	
Large Straight	
Full House	
Chance	
YATZY (50)	
TOTAL SUM	