



Figure 1: Example screenshot of a program that uses only a combination of the characters '-', '|', and '*' or 'o' (as well as whitespace) to display a pictorial representation of three rolled dice.

Homework Description

Consider the following *IEC Dice Game* using three six-sided dice: one red die and two white, “scoring” dice. The game is played against the computer, with rules described below.

Game Rules:

- Both the computer and the player start with a score of zero.
- At the beginning of the game, the computer rolls the two white (scoring) dice 3 times. For each roll, only one die is shown to the player even though both dice are used to compute the score. The computer score is the sum of the six values rolled (and should not be revealed to the user at this point).
- Then it is the player’s turn. The player’s goal is to score higher than the computer.
 - The player starts by rolling all three dice (both of the two scoring dice as well as the red die).
 - The player’s current score is computed based on two factors:
 1. The sum of the two white (scoring) dice – the sum of these two dice serve as the “initial” score for this turn (e.g. in the figure above, the initial score is $4+2 = 6$).
 2. The value of the red die:
 - If the red die value is the same as one of the scoring die, the initial score is doubled (e.g. if the red die rolled a 1 and the scoring dice rolled 1 & 5, the current score would be $(5+1)*2 = 12$)
 - If the red die value is the same as both of the scoring die, the initial score is tripled (e.g. if all dice roll a 5, the total score would be $(5+5)*3 = 30$).
 - If the red die rolls a 1 and the white dice do not roll a 1, the player’s total score is reset to zero and the **player’s turn ends**. Note that in this case the player would lose the game as the computer score would always be greater than zero.
 - The player’s current score is added to the player’s previous total score, and then the player is asked if he/she wants to roll the dice again. If the player decides not to roll again, the player’s turn ends.
- After the player’s turn is over, the computer’s score is revealed (remember, the player only knew what was rolled by one of the two dice for each of the computer’s three times rolling). The computer’s score is compared to the player’s score and the highest score wins.

In this homework assignment, you will implement this game. A few requirements:

- Each die-roll should be determined with a random number generator.
- To make the game appear more “realistic,” you are required to display pictorial

representations of the dice rather than just displaying numbers for the dice values. For example, Figure 1 shows an example of a potential screenshot of a program displaying the three rolled dice. The red die (first die in Figure 1) should be distinguishable from the scoring dice (in the Figure 1 example, this is achieved by using 'o' as the marker on the red die, vs '*' for the white dice).

- At the beginning of the game, your program should display the value of one scoring die for each of the three computer rolls.
- Similarly, each time the player rolls the dice, your program should display a pictorial representation of the values of each of the three dice and display both the *current* (i.e. single turn) and *total* score for the player. If eligible, you should ask the player whether he/she wants to roll again.
- At the end of the player's turn, your program should display the final score of the player (based on the scoring system described above) and the computer's score. Your program should then determine and display which player wins. At the end of the game, your program should ask the user if he/she wants to play again

Grading Rubric

- 70 points for working code:
 - 10 points for correct implementation of the rolling/displaying the dice/scoring for the computer's turn
 - 30 points for correct implementation of rolling/displaying the dice within the player's turn:
 - 10 points for correctly determining (including use of random number generator) the three dice values
 - 10 points for correctly displaying appropriate pictorial representations of the red and white dice (note: you may NOT use numbers in your pictorial representation)
 - 10 points for correctly "re-rolling" the dice when desired to be re-rolled and correctly ending the player's turn when appropriate (based on rules and player choice)
 - 15 points for correct implementation of scoring:
 - 5 points for correctly calculating score based on the values of the three dice within a roll
 - 5 points for correctly keeping track of the player's score during the turn
 - 5 points for correctly determining/displaying the winner at the end of the game
 - 5 points for correctly starting a new game after the game is over
 - 10 points for appropriately defining/using functions to implement the game
- 30 points for style (see Style Guide on ICON) and readability:
 - style: 5 points for comment block above top of program and above any programmer-defined functions
 - style: 5 points for meaningful variable names
 - style: 5 points for proper indentation
 - style: 5 points for in-line comments
 - readability: 10 points for using functions/loops as appropriate to avoid excessively redundant code