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CPADS Final Project – Enhanced Turtle Game

1. Your task is to enhance the simple Turtle Game from Assignment 3. You may start with the solution Python file posted on the Assignment page. Refer to the Assignment 3 Strategies solution for more information on the requirements for the original assignment.

   Here are two approaches for enhancing the Turtle Game. You should implement as many of the listed enhancements as possible.

   1) <u>Dueling Turtles:</u>
   - a. Create 4 turtles – having 4 different colors. They all start at the origin.
   - b. The goal is to score as many points as possible.
   - c. Points are scored by touching each of the obstacles – once each.
   - d. Touching an object more than once subtracts the points that the obstacle was worth for each additional touch after the first one.
   - e. The first touch of an obstacle is indicated by a small circle of the same color as the turtle. Any subsequent touch of an obstacle is indicated by a small square with an 'X' through it.
   - f. The markers are located at the point of collision with the obstacle.
   - g. Track the total distance that each turtle moves. Points are lost for excess movement.
   - h. Collisions with the boundary walls also result in lost points. Collisions with the boundaries will also leave appropriate markers behind at the point of collision.
   - i. Add "bounce" to the obstacles – when a turtle touches an obstacle, it will leave behind the appropriate marker, and "bounce" off the obstacle in a random direction, opposite to the approach angle.
   - j. Each move will continue through the bounce until the end of the move distance.
   - k. The winner is the turtle that returns to the origin, after touching all the obstacles, and has the most total points.
   - l. The final point total consists of the obstacle points (+ and -), collisions with boundaries (-), movement points (-), and points for the order of return to the origin.
   - m. Points should be displayed in the console, for all four turtles, as they are accumulated.
   - n. The progress for each turtle should also be displayed: obstacles touched, boundary collisions, distance moved, etc.
   - o. The game ends when the last turtle returns to the origin.

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2. **Turtle Maze**
    a. Create a maze for the turtle(s) to navigate.
    b. Two turtles start at either end of the maze.
    c. Points are accumulated similarly to the above description: first touch of any obstacle results in positive points, and subsequent touch of that obstacle results in negative points.
    d. Hitting any maze wall, or boundary, results in lost points.
    e. All collisions should be marked with markers. Positive collisions with a small circle of the turtle's color. Negative collisions marked with a small square with an "X" through it.
    f. The maze consists of a series of long thin rectangles at appropriate locations of your choice. Obstacles consist of squares and rectangles in the maze path – that are not connected to the maze walls.
    g. Points are lost for excess movement – keep track of the entire distance each turtle moves.
    h. The winner is the turtle that reaches the opposite end of the maze with the most points.
    i. Points are awarded / penalized based on the # of obstacles touched (once), boundary collisions, differential movement between turtles, and order of arrival at the opposite end of the maze.
    j. Points should be displayed in the console, for both turtles, as they are accumulated.
    k. The progress for each turtle should also be displayed: obstacles touched, boundary collisions, distance moved, etc.

NOTE: For either project, you must provide your strategy for designing and developing your version of the project. The above requirements are open to your interpretation. For your proposal, you must specify your approach to each of the points listed under the respective project.