Subject: Computer Programming: Python

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FAT Question: 1

Write a Python program to simulate a two-player Snake and Ladder game. The rules and requirements are as follows:

The game involves two players starting from position 0. The first player to reach exactly position 30 wins the game.

Snakes: If a player lands on a position with a snake, they move down to the specified lower position:

Position 17 → 4

Position 19 → 7

Position 21 → 9

Position 27 → 1

Ladders: If a player lands on a position with a ladder, they climb up to the specified higher position:

Position 11 → 22

Position 3 → 8

Position 5 → 26

Position 20 → 29

A player must roll the dice to determine their move. For this program:

The dice roll should be manually entered as an integer between 1 and 6 by the player.

If a player's total position exceeds 30, they stay at their previous position and wait for an exact dice roll to reach 30.

The game alternates between Player 1 and Player 2. After each turn, display the player's new position and any actions due to snakes or ladders.

Declare the winner once a player reaches position 30.

Write the program to handle the above conditions and ensure proper input validation for the dice rolls. (Note: Without using any kind of libraries)

Solution:

Input:

1. Dice rolls manually entered by players (1-6).
2. Confirmation to proceed with the turn.

Output:

1. Current positions of both players after each move.
2. Notifications for encountering snakes or ladders.
3. Declaration of the winner when a player reaches position 30.

Processing:

1. Validate dice roll input.
2. Alternate turns between Player 1 and Player 2.
3. Update player positions based on dice rolls.
4. Check for snake or ladder encounters and update positions accordingly.
5. Prevent overshooting beyond position 30.
6. Declare a winner when a player reaches exactly position 30.

Algorithm:

1. **Initialize**:
    - Set starting positions for both players as 0.
    - Define snakes and ladders as dictionaries.
2. **Turn Mechanism**:
    - Prompt the current player for a dice roll.
    - Validate the dice roll to ensure it's between 1 and 6.
    - Update the player's position based on the dice roll.
    - Check if the player encounters a snake or ladder and adjust their position.
    - Ensure the player does not exceed position 30.
    - Alternate turns.
3. **End Condition**:
    - Check after each move if a player has reached position 30.
    - Declare the winner and end the game.
4. **Repeat**:
    - Continue alternating turns until a winner is determined.

Solution Alternative:

Instead of manually inputting dice rolls, the dice roll could be automated using a random number generator (random.randint(1, 6)). However, since the requirement specifies manual input, this method will be implemented.

Code:

```
print("Welcome to Snake and Ladder!")

# Snakes and Ladders definition
snakes = {17: 4, 19: 7, 21: 9, 27: 1}
ladders = {3: 8, 5: 26, 11: 22, 20: 29}

# Initialize player positions
player_positions = [0, 0]

# Function to check for snakes or ladders
def check_snakes_ladders(position):
    if position in snakes:
        print(f"Oops! Snake at {position}. Sliding down to {snakes[position]}.")
        return snakes[position]
    elif position in ladders:
        print(f"Yay! Ladder at {position}. Climbing up to {ladders[position]}.")
        return ladders[position]
    return position

# Function to handle a player's turn
def take_turn(player):
    while True:
        try:
            dice_roll = int(input(f"Player {player + 1}, enter your dice roll (1-6): "))
            if dice_roll < 1 or dice_roll > 6:
                print("Invalid input. Please enter a number between 1 and 6.")
                continue
            break
        except ValueError:
```

```
            print("Invalid input. Please enter a valid number.")

    new_position = player_positions[player] + dice_roll

    # Handle overshooting
    if new_position > 30:
        print(f"Overshot! Player {player + 1} remains at {player_positions[player]}.")
        return player_positions[player]

    # Update position and check for snakes or ladders
    new_position = check_snakes_ladders(new_position)
    print(f"Player {player + 1} moved to position {new_position}.")
    return new_position

# Game loop
def game():
    turn = 0
    while True:
        # Current player's turn
        current_player = turn % 2
        print(f"\nPlayer {current_player + 1}'s turn.")
        player_positions[current_player] = take_turn(current_player)

        # Check for a winner
        if player_positions[current_player] == 30:
            print(f"Congratulations! Player {current_player + 1} wins!")
            break

        # Switch turn
        turn += 1
```

Start the game

game()

Output flow:

```
Welcome to Snake and Ladder!

Player 1's turn.
Player 1, enter your dice roll (1-6): 6
Player 1 moved to position 6.

Player 2's turn.
Player 2, enter your dice roll (1-6): 4
Player 2 moved to position 4.

Player 1's turn.
Player 1, enter your dice roll (1-6): 1
Player 1 moved to position 7.

Player 2's turn.
Player 2, enter your dice roll (1-6): 5
Player 2 moved to position 9.

Player 1's turn.
Player 1, enter your dice roll (1-6): 6
Player 1 moved to position 13.

Player 2's turn.
Player 2, enter your dice roll (1-6): 2
Yay! Ladder at 11. Climbing up to 22.
Player 2 moved to position 22.

Player 1's turn.
Player 1, enter your dice roll (1-6): 3
Player 1 moved to position 16.

Player 2's turn.
Player 2, enter your dice roll (1-6): 1
Player 2 moved to position 23.

Player 1's turn.
Player 1, enter your dice roll (1-6): 3
Oops! Snake at 19. Sliding down to 7.
Player 1 moved to position 7.

Player 2's turn.
```

```
Player 2, enter your dice roll (1-6): 4
Oops! Snake at 27. Sliding down to 1.
Player 2 moved to position 1.

Player 1's turn.
Player 1, enter your dice roll (1-6): 6
Player 1 moved to position 13.

Player 2's turn.
Player 2, enter your dice roll (1-6): 4
Yay! Ladder at 5. Climbing up to 26.
Player 2 moved to position 26.

Player 1's turn.
Player 1, enter your dice roll (1-6): 8
Invalid input. Please enter a number between 1 and 6.
Player 1, enter your dice roll (1-6): 2
Player 1 moved to position 15.

Player 2's turn.
Player 2, enter your dice roll (1-6): 1
Oops! Snake at 27. Sliding down to 1.
Player 2 moved to position 1.

Player 1's turn.
Player 1, enter your dice roll (1-6): 2
Oops! Snake at 17. Sliding down to 4.
Player 1 moved to position 4.

Player 2's turn.
Player 2, enter your dice roll (1-6): 3
Player 2 moved to position 4.

Player 1's turn.
Player 1, enter your dice roll (1-6): 5
Player 1 moved to position 9.

Player 2's turn.
Player 2, enter your dice roll (1-6): 6
Player 2 moved to position 10.

Player 1's turn.
Player 1, enter your dice roll (1-6): 2
Yay! Ladder at 11. Climbing up to 22.
Player 1 moved to position 22.

Player 2's turn.
```

```
Player 2, enter your dice roll (1-6): 3
Player 2 moved to position 13.

Player 1's turn.
Player 1, enter your dice roll (1-6): 4
Player 1 moved to position 26.

Player 2's turn.
Player 2, enter your dice roll (1-6): 5
Player 2 moved to position 18.

Player 1's turn.
Player 1, enter your dice roll (1-6): 1
Oops! Snake at 27. Sliding down to 1.
Player 1 moved to position 1.

Player 2's turn.
Player 2, enter your dice roll (1-6): 5
Player 2 moved to position 23.

Player 1's turn.
Player 1, enter your dice roll (1-6): 3
Player 1 moved to position 4.

Player 2's turn.
Player 2, enter your dice roll (1-6): 5
Player 2 moved to position 28.

Player 1's turn.
Player 1, enter your dice roll (1-6): 5
Player 1 moved to position 9.

Player 2's turn.
Player 2, enter your dice roll (1-6): 2
Player 2 moved to position 30.
Congratulations! Player 2 wins!
```