Subject/Odd Sem 2023-23/Experiment 3

Program :

1.

```
def calculate_mixed_strategy_nash_equilibrium():
    print("Matching Pennies Game Nash Equilibrium Calculator!")
    print("Player 1 (Row Player) chooses H with probability p and T with probability 1-p.")
    print("Player 2 (Column Player) chooses H with probability q and T with probability 1-q.")

    # Get the input probabilities from the user for Player 1
    while True:
        try:
            p = float(input("Enter the probability (0 to 1) that Player 1 chooses H (p): "))
            if 0 <= p <= 1:
                break
            else:
                print("Invalid input. Please enter a probability between 0 and 1.")
        except ValueError:
            print("Invalid input. Please enter a valid number between 0 and 1.")

    # Calculate Player 2's mixed strategy based on Player 1's strategy
    q = (2 * p - 1) / (2 * p)

    # Check if q is a valid probability (between 0 and 1)
    if 0 <= q <= 1:
        print("\nMixed Strategy Nash Equilibrium:")
        print("Player 1's Mixed Strategy (p):", p)
        print("Player 2's Mixed Strategy (q):", q)
```

```
    else:
        print("No valid Nash equilibrium exists.")

if __name__ == "__main__":
    calculate_mixed_strategy_nash_equilibrium()
```

Output

P = 0

```
Welcome to the Matching Pennies Game Nash Equilibrium Calculator!
Player 1 (Row Player) chooses H with probability p and T with probability 1-p.
Player 2 (Column Player) chooses H with probability q and T with probability 1-q.
Enter the probability (0 to 1) that Player 1 chooses H (p): 0.5

Mixed Strategy Nash Equilibrium:
Player 1's Mixed Strategy (p): 0.5
Player 2's Mixed Strategy (q): 0.0
```

P = 0.3

```
Matching Pennies Game Nash Equilibrium Calculator!
Player 1 (Row Player) chooses H with probability p and T with probability 1-p.
Player 2 (Column Player) chooses H with probability q and T with probability 1-q.
Enter the probability (0 to 1) that Player 1 chooses H (p): 0.3
No valid Nash equilibrium exists.
```

P = 0.9

```
Matching Pennies Game Nash Equilibrium Calculator!
Player 1 (Row Player) chooses H with probability p and T with probability 1-p.
Player 2 (Column Player) chooses H with probability q and T with probability 1-q.
Enter the probability (0 to 1) that Player 1 chooses H (p): 0.9

Mixed Strategy Nash Equilibrium:
Player 1's Mixed Strategy (p): 0.9
Player 2's Mixed Strategy (q): 0.4444444444444445
```