Final_Book_2

September 19, 2025

[1]:
```
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
import random
import statistics
import math
from fractions import Fraction

# Set the seed
np.random.seed(42)
random.seed(42)sn
```

[64]:
```
# Set the variables
players = 1172315
participation_rate = Fraction(1, 5)
game_participation = players * participation_rate
entry_fee = Fraction(13, 4) # 3.25
payout_rate = Fraction(68, 100)
platform_margin = 1 - payout_rate
charitable_rate = Fraction(1, 10)

print(f"Game Participation: {game_participation}")
```

```
Game Participation: 234463
```

[65]:
```
# Pot values
total_pot = game_participation * entry_fee

player_pot = round(game_participation * payout_rate) * entry_fee
leftover_pot = total_pot - player_pot
charity_pot = leftover_pot * charitable_rate
platform_profit = leftover_pot - charity_pot

print(f"Total pot: £{total_pot:.2f}")
print(f"Player pot: £{player_pot:.2f}")
print(f"Charity pot: £{charity_pot:.2f}")
print(f"Platform profit: £{platform_profit:.2f}")
```

```
Total pot: £762004.75
```

```
Player pot: £518163.75
Charity pot: £24384.10
Platform profit: £219456.90
```

[66]:
```python
# number of scratchcards

# G1 = 0 - 5 %
# G2 = 5 - 20 %
# G3 = 20 - 50 %
# G4 = 50 - 100 %

G1 = round(Fraction(5, 100) * game_participation) * 10 #10 cards per person
G2 = round(Fraction(15, 100) * game_participation) * 6 #6 cards per person
G3 = round(Fraction(30, 100) * game_participation) * 3 #3 cards per person
G4 = round(Fraction(50, 100) * game_participation) #everyone gets 1

total_scratchcards = G1 + G2 + G3 + G4

print(f"G1: {G1}")
print(f"G2: {G2}")
print(f"G3: {G3}")
print(f"G4: {G4}")
print(f"Total Scratchcards: {total_scratchcards}")
```

```
G1: 117230
G2: 211014
G3: 211017
G4: 117232
Total Scratchcards: 656493
```

[67]:
```python
# Prize Values
P1 = entry_fee * 1
P2 = entry_fee * 2
P3 = entry_fee * 4
P4 = entry_fee * 7
P5 = entry_fee * 10

print(f"P1: £{P1:.2f}")
print(f"P2: £{P2:.2f}")
print(f"P3: £{P3:.2f}")
print(f"P4: £{P4:.2f}")
print(f"P5: £{P5:.2f}")
```

```
P1: £3.25
P2: £6.50
P3: £13.00
P4: £22.75
P5: £32.50
```

[68]:
```
z = Fraction(1, 10)
total_winning_scratchcards = round(z * total_scratchcards)
Val=round(game_participation * payout_rate)

print(f"Total Winning Scratchcards: {total_winning_scratchcards}")
print(f"Entry Fee Multiplier: {Val}")
```

```
Total Winning Scratchcards: 65649
Entry Fee Multiplier: 159435
```

[ ]:
```
!jupyter nbconvert --to pdf Final_Book_2.ipynb
```