2017

Gutsy Program Statistics Report

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Introduction

The Gutsy program was created with the purpose of gathering statistical data to determine how to select the best risk factor so that a player has the highest probability of winning. The statistical data gathered includes the probability of rolling every number on a 6-sided die, the average number of times a player rolls per turn to reach their risk factor, the average number of times the die is rolled by the winner to accumulate 101 points (the win value) in a game and the probability of each player winning a game.

Gutsy Program Run No. 1

Program Input

For the programs first run I used the following input data.

Players = 2

Games = 10

Player Name	Risk Factor
Tayla	10
Beau	15

Game 1

Output

```
Game 1 - Table
    Player      Turn Points     Total Points
    TAYLA       10              59
    BEAU        19              105

        ***** Winner: BEAU *****

Game 1 - Statistics
        P(1) = 0.1250
        P(2) = 0.2143
        P(3) = 0.1071
        P(4) = 0.2321
        P(5) = 0.1250
        P(6) = 0.1964
        BEAU - A(15)    = 4
        TAYLA - A(10)   = 3
        A(101) = 33
```

Game 2

Output

```
Game 2 - Table
    Player      Turn Points     Total Points
    TAYLA       0               88
    BEAU        15              114

        ***** Winner: BEAU *****

Game 2 - Statistics
        P(1) = 0.1643
        P(2) = 0.2143
        P(3) = 0.1286
        P(4) = 0.2071
        P(5) = 0.1143
        P(6) = 0.1714
        BEAU - A(15)    = 3
        TAYLA - A(10)   = 2
        A(101) = 51
```

Game 3

Output

```
Game 3 - Table
    Player      Turn Points     Total Points
    TAYLA       0               81
    BEAU        15              112

        ***** Winner: BEAU *****

Game 3 - Statistics
        P(1) = 0.1689
        P(2) = 0.1781
        P(3) = 0.1279
        P(4) = 0.1872
        P(5) = 0.1735
        P(6) = 0.1644
        BEAU - A(15)    = 3
        TAYLA - A(10)   = 3
        A(101) = 44
```

Game 4

Output

```
Game 4 - Table
    Player      Turn Points     Total Points
    TAYLA       13              88
    BEAU        17              117

        ***** Winner: BEAU *****

Game 4 - Statistics
        P(1) = 0.1661
        P(2) = 0.1593
        P(3) = 0.1458
        P(4) = 0.1797
        P(5) = 0.1729
        P(6) = 0.1763
        BEAU - A(15)    = 3
        TAYLA - A(10)   = 2
        A(101) = 45
```

Game 5

Output

```
Game 5 - Table
    Player      Turn Points     Total Points
    TAYLA       11              104
    BEAU        0               67

        ***** Winner: TAYLA *****

Game 5 - Statistics
        P(1) = 0.1657
        P(2) = 0.1573
        P(3) = 0.1517
        P(4) = 0.1713
        P(5) = 0.1713
        P(6) = 0.1826
        BEAU - A(15)    = 2
        TAYLA - A(10)   = 3
        A(101) = 34
```

Game 6

Output

```
Game 6 - Table
    Player      Turn Points     Total Points
    TAYLA       12              112
    BEAU        0               97

        ***** Winner: TAYLA *****

Game 6 - Statistics
        P(1) = 0.1690
        P(2) = 0.1505
        P(3) = 0.1528
        P(4) = 0.1667
        P(5) = 0.1713
        P(6) = 0.1898
        BEAU - A(15)    = 3
        TAYLA - A(10)   = 2
        A(101) = 36
```

Game 7

Output

```
Game 7 - Table
    Player      Turn Points     Total Points
    TAYLA       10              108
    BEAU        0               56

        ***** Winner: TAYLA *****

Game 7 - Statistics
        P(1) = 0.1846
        P(2) = 0.1563
        P(3) = 0.1563
        P(4) = 0.1638
        P(5) = 0.1620
        P(6) = 0.1770
        BEAU - A(15)    = 3
        TAYLA - A(10)   = 2
        A(101) = 47
```

Game 8

Output

```
Game 8 - Table
    Player      Turn Points     Total Points
    TAYLA       10              41
    BEAU        18              102

        ***** Winner: BEAU *****

Game 8 - Statistics
        P(1) = 0.1793
        P(2) = 0.1586
        P(3) = 0.1672
        P(4) = 0.1603
        P(5) = 0.1621
        P(6) = 0.1724
        BEAU - A(15)    = 4
        TAYLA - A(10)   = 3
        A(101) = 29
```

Game 9

Output

```
Game 9 - Table
    Player      Turn Points     Total Points
    TAYLA       0               43
    BEAU        16              102

        ***** Winner: BEAU *****

Game 9 - Statistics
        P(1) = 0.1731
        P(2) = 0.1538
        P(3) = 0.1731
        P(4) = 0.1619
        P(5) = 0.1651
        P(6) = 0.1731
        BEAU - A(15)    = 4
        TAYLA - A(10)   = 3
        A(101) = 26
```

Game 10 & Final Statistics

```
Game 10 - Table
    Player      Turn Points     Total Points
    TAYLA       12              104
    BEAU        0               33

        ***** Winner: TAYLA *****

Game 10 - Statistics
        P(1) = 0.1746
        P(2) = 0.1524
        P(3) = 0.1760
        P(4) = 0.1538
        P(5) = 0.1716
        P(6) = 0.1716
        BEAU - A(15)    = 2
        TAYLA - A(10)   = 3
        A(101) = 29

Final - Statistics
        P(1) = 0.1729
        P(2) = 0.1594
        P(3) = 0.1591
        P(4) = 0.1673
        P(5) = 0.1653
        P(6) = 0.1760
        BEAU - A(15)    = 3
        P(WIN)          = 0.6000
        TAYLA - A(10)   = 2
        P(WIN)          = 0.4000
        A(101) = 37
```

Observations

Beau picking the number 15 had the highest probability of winning at 60%, 20% percent higher than Tayla. Players were less likely to roll a 2 or a 4 and a higher chance of rolling either a 1 ,3 , 5 or a 6.

Gutsy Program Run No. 2

Program Input

For the programs second run I used the following input data.

Players = 2

Games = 100

Player Name	Risk Factor
Tayla	10
Beau	15

Final Statistics

Output

```
Final - Statistics
        P(1) = 0.1701
        P(2) = 0.1570
        P(3) = 0.1706
        P(4) = 0.1704
        P(5) = 0.1648
        P(6) = 0.1671
        BEAU - A(15)    = 3
        P(WIN)          = 0.5800
        TAYLA - A(10)   = 2
        P(WIN)          = 0.4200
        A(101) = 36
```

Observations

Beau picking the number 15 had the highest probability of winning at 58%, 16% percent higher than Tayla. Players were less likely to roll a 2, 4 or 5 and a higher chance of rolling either a 1, 3 or a 4.

Gutsy Program Run No. 3

Program Input

For the programs third run I used the following input data.

Players = 2

Games = 1000

Player Name	Risk Factor
Tayla	10
Beau	15

Final Statistics

Output

```
Final - Statistics
        P(1) = 0.1677
        P(2) = 0.1691
        P(3) = 0.1670
        P(4) = 0.1643
        P(5) = 0.1676
        P(6) = 0.1643
        BEAU - A(15)    = 3
        P(WIN)          = 0.6120
        TAYLA - A(10)   = 2
        P(WIN)          = 0.3880
        A(101) = 37
```

Observations

Beau picking the number 15 had the highest probability of winning at 61%, 22% percent higher than Tayla. The probability of rolling numbers between 1 and 6 were almost identical.

Gutsy Program Run No. 4

Program Input

For the programs fourth run I used the following input data.

Players = 4

Games = 10

Player Name	Risk Factor
Tayla	10
Sofia	15
Jordan	20
Beau	25

Game 1

Output

```
Game 1 - Table
    Player      Turn Points     Total Points
    TAYLA       14              57
    SOFIA       0               66
    JORDAN      21              114
    BEAU        0               80

        ***** Winner: JORDAN *****

Game 1 - Statistics
        P(1) = 0.1120
        P(2) = 0.1920
        P(3) = 0.1760
        P(4) = 0.1600
        P(5) = 0.1680
        P(6) = 0.1920
        BEAU - A(25)    = 5
        JORDAN - A(20)  = 5
        SOFIA - A(15)   = 4
        TAYLA - A(10)   = 3
        A(101) = 37
```

Game 2

Output

```
Game 2 - Table
    Player      Turn Points     Total Points
    TAYLA       11              84
    SOFIA       17              101
    JORDAN      0               21
    BEAU        0               25

        ***** Winner: SOFIA *****

Game 2 - Statistics
        P(1) = 0.1358
        P(2) = 0.1975
        P(3) = 0.1811
        P(4) = 0.1564
        P(5) = 0.1523
        P(6) = 0.1770
        BEAU - A(25)    = 3
        JORDAN - A(20)  = 4
        SOFIA - A(15)   = 4
        TAYLA - A(10)   = 3
        A(101) = 36
```

Game 3

Output

```
Game 3 - Table
    Player      Turn Points     Total Points
    TAYLA       0               50
    SOFIA       0               17
    JORDAN      22              105
    BEAU        0               26

        ***** Winner: JORDAN *****

Game 3 - Statistics
        P(1) = 0.1433
        P(2) = 0.1815
        P(3) = 0.1720
        P(4) = 0.1433
        P(5) = 0.1783
        P(6) = 0.1815
        BEAU - A(25)    = 3
        JORDAN - A(20)  = 5
        SOFIA - A(15)   = 3
        TAYLA - A(10)   = 2
        A(101) = 28
```

Game 4

Output

```
Game 4 - Table
    Player      Turn Points     Total Points
    TAYLA       14              89
    SOFIA       19              73
    JORDAN      21              110
    BEAU        0               52

        ***** Winner: JORDAN *****

Game 4 - Statistics
        P(1) = 0.1454
        P(2) = 0.1812
        P(3) = 0.1588
        P(4) = 0.1633
        P(5) = 0.1723
        P(6) = 0.1790
        BEAU - A(25)    = 4
        JORDAN - A(20)  = 4
        SOFIA - A(15)   = 3
        TAYLA - A(10)   = 3
        A(101) = 38
```

Game 5

Output

```
Game 5 - Table
    Player      Turn Points     Total Points
    TAYLA       10              46
    SOFIA       15              35
    JORDAN      0               0
    BEAU        29              110

        ***** Winner: BEAU *****

Game 5 - Statistics
        P(1) = 0.1392
        P(2) = 0.1843
        P(3) = 0.1569
        P(4) = 0.1588
        P(5) = 0.1745
        P(6) = 0.1863
        BEAU - A(25)    = 7
        JORDAN - A(20)  = 4
        SOFIA - A(15)   = 3
        TAYLA - A(10)   = 3
        A(101) = 26
```

Game 6

Output

```
Game 6 - Table
    Player      Turn Points     Total Points
    TAYLA       13              60
    SOFIA       0               32
    JORDAN      23              23
    BEAU        30              113

        ***** Winner: BEAU *****

Game 6 - Statistics
        P(1) = 0.1355
        P(2) = 0.1835
        P(3) = 0.1612
        P(4) = 0.1612
        P(5) = 0.1732
        P(6) = 0.1852
        BEAU - A(25)    = 6
        JORDAN - A(20)  = 3
        SOFIA - A(15)   = 2
        TAYLA - A(10)   = 3
        A(101) = 31
```

Game 7

Output

```
Game 7 - Table
    Player      Turn Points     Total Points
    TAYLA       0               58
    SOFIA       0               15
    JORDAN      25              69
    BEAU        29              112

        ***** Winner: BEAU *****

Game 7 - Statistics
        P(1) = 0.1388
        P(2) = 0.1787
        P(3) = 0.1610
        P(4) = 0.1669
        P(5) = 0.1669
        P(6) = 0.1876
        BEAU - A(25)    = 6
        JORDAN - A(20)  = 3
        SOFIA - A(15)   = 2
        TAYLA - A(10)   = 2
        A(101) = 40
```

Game 8

Output

```
Game 8 - Table
    Player      Turn Points     Total Points
    TAYLA       12              56
    SOFIA       0               100
    JORDAN      23              106
    BEAU        0               52

        ***** Winner: JORDAN *****

Game 8 - Statistics
        P(1) = 0.1451
        P(2) = 0.1829
        P(3) = 0.1585
        P(4) = 0.1720
        P(5) = 0.1610
        P(6) = 0.1805
        BEAU - A(25)    = 4
        JORDAN - A(20)  = 4
        SOFIA - A(15)   = 4
        TAYLA - A(10)   = 2
        A(101) = 44
```

Game 9

Output

```
Game 9 - Table
    Player      Turn Points     Total Points
    TAYLA       11              67
    SOFIA       0               85
    JORDAN      21              102
    BEAU        0               56

        ***** Winner: JORDAN *****

Game 9 - Statistics
        P(1) = 0.1432
        P(2) = 0.1832
        P(3) = 0.1579
        P(4) = 0.1737
        P(5) = 0.1674
        P(6) = 0.1747
        BEAU - A(25)    = 5
        JORDAN - A(20)  = 4
        SOFIA - A(15)   = 4
        TAYLA - A(10)   = 2
        A(101) = 37
```

Game 10 & Final Statistics

Output

```
Game 10 - Table
    Player      Turn Points     Total Points
    TAYLA       10              37
    SOFIA       15              64
    JORDAN      20              107
    BEAU        0               27

        ***** Winner: JORDAN *****

Game 10 - Statistics
        P(1) = 0.1425
        P(2) = 0.1795
        P(3) = 0.1624
        P(4) = 0.1747
        P(5) = 0.1700
        P(6) = 0.1709
        BEAU - A(25)    = 5
        JORDAN - A(20)  = 5
        SOFIA - A(15)   = 3
        TAYLA - A(10)   = 2
        A(101) = 34

Final - Statistics
        P(1) = 0.1409
        P(2) = 0.1826
        P(3) = 0.1617
        P(4) = 0.1667
        P(5) = 0.1685
        P(6) = 0.1797
        BEAU - A(25)    = 5
        P(WIN)          = 0.3000
        JORDAN - A(20)  = 4
        P(WIN)          = 0.6000
        SOFIA - A(15)   = 3
        P(WIN)          = 0.1000
        TAYLA - A(10)   = 2
        P(WIN)          = 0.0000
        A(101) = 35
```

Observations

Jordan, picking the number 20, had the highest probability of winning at 60%, 30% higher than anyone else. Tayla didn't win any games. Players were more likely to roll either a 2 or a 6 and less likely to roll a 1, 3, 4 or a 5.

Gutsy Program Run No. 5

Program Input

For the programs fifth run I used the following input data.

Players = 4

Games = 100

Player Name	Risk Factor
Tayla	10
Sofia	15
Jordan	20
Beau	25

Final Statistics

Output

```
Final - Statistics
        P(1) = 0.1630
        P(2) = 0.1628
        P(3) = 0.1709
        P(4) = 0.1679
        P(5) = 0.1731
        P(6) = 0.1624
        BEAU - A(25)    = 4
        P(WIN)          = 0.3400
        JORDAN - A(20)  = 4
        P(WIN)          = 0.3000
        SOFIA - A(15)   = 3
        P(WIN)          = 0.2700
        TAYLA - A(10)   = 2
        P(WIN)          = 0.0900
        A(101) = 38
```

Observations

Jordan picking the number 20 had the highest probability of winning at 60%, 30% higher than anyone else. Tayla didn't win any games. Players were more likely to roll either a 2 or a 6 and less likely to roll a 1, 3, 4 or a 5.

Gutsy Program Run No. 5

Program Input

For the programs sixth run I used the following input data.

Players = 4

Games = 1000

Player Name	Risk Factor
Tayla	10
Sofia	15
Jordan	20
Beau	25

Final Statistics

Output

```
Final - Statistics
        P(1) = 0.1662
        P(2) = 0.1672
        P(3) = 0.1687
        P(4) = 0.1668
        P(5) = 0.1666
        P(6) = 0.1644
        BEAU - A(25)    = 4
        P(WIN)          = 0.3250
        JORDAN - A(20)  = 4
        P(WIN)          = 0.2910
        SOFIA - A(15)   = 3
        P(WIN)          = 0.2680
        TAYLA - A(10)   = 2
        P(WIN)          = 0.1160
        A(101) = 38
```

Observations

Beau, picking the number 25, had the highest probability of winning at 32.5%, 3.4% higher than Jordan at 29.1%. Tayla, picking the number 10, was the least likely to win a game. The probability of rolling numbers between 1 and 6 were almost identical.

Conclusion

By analysing the statistics from all the times the program ran, it was easy to determine that picking the higher number gives the player the highest probability of winning. The probability of rolling different numbers also became more even when playing a higher number of games. This proves that the players chances of rolling any one number is almost identical and that the die is not loaded.