



MA 323 : MONTE CARLO SIMULATION LAB 4

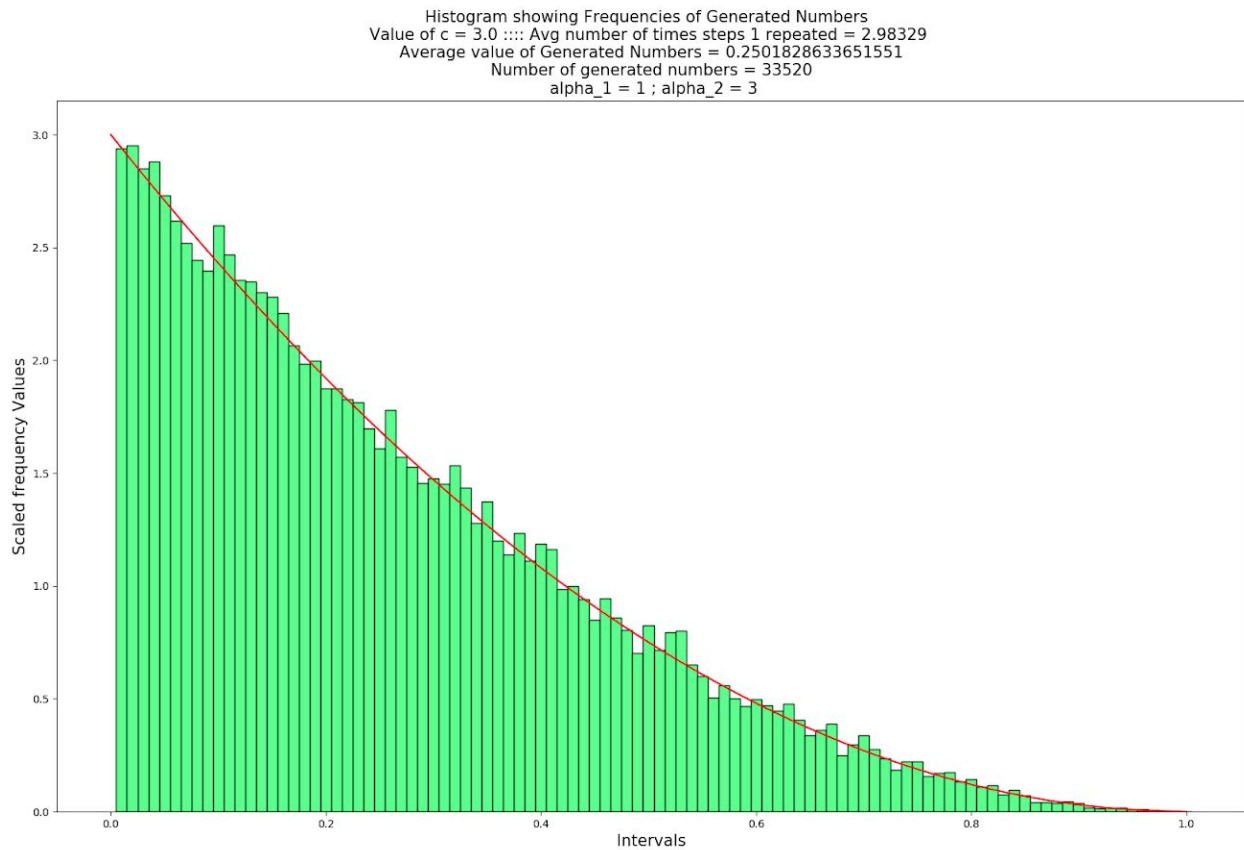
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CASE-I

1. ALPHA_1 = 1, ALPHA_2 = 3



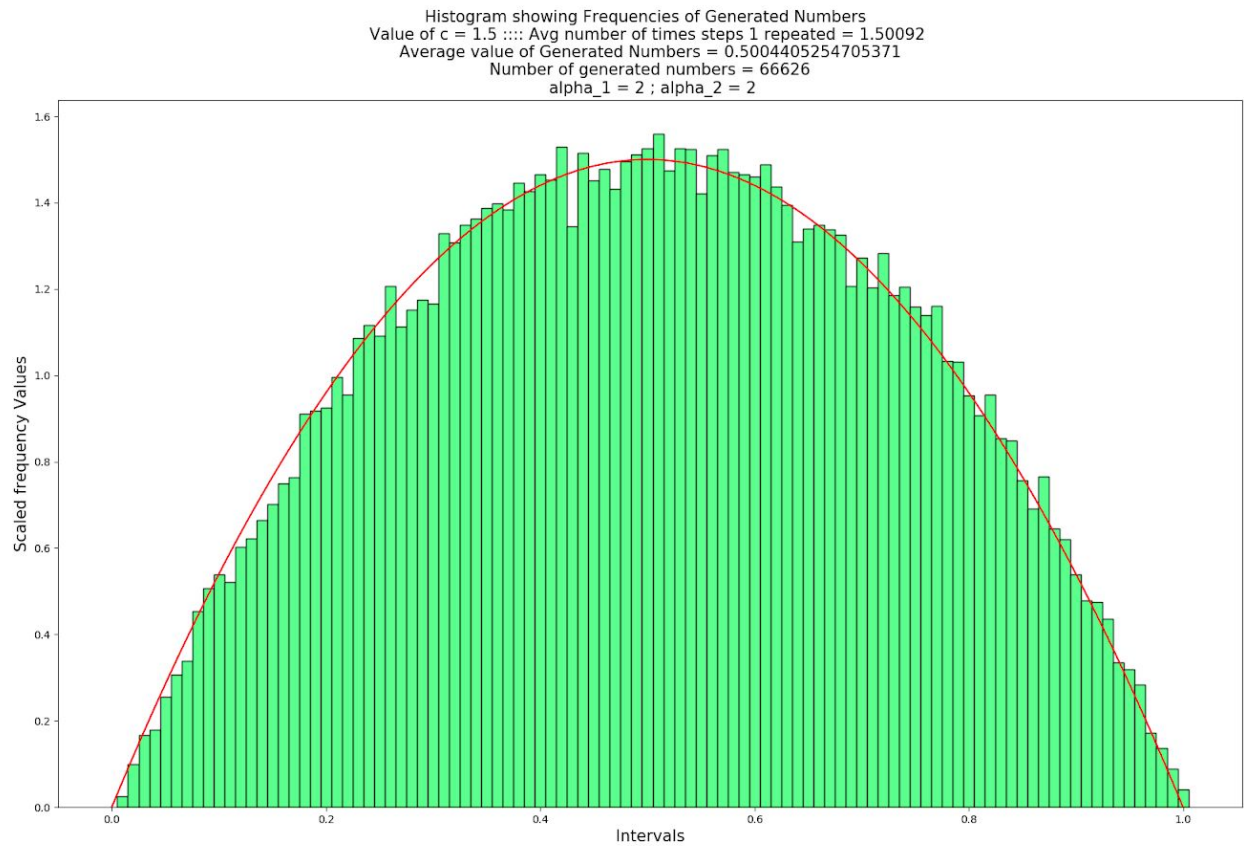
2. $x^* = (\alpha_1 - 1)/(\alpha_1 + \alpha_2 - 2) = (1-1)/(1+3-2) = 0$

3. $1/B(1,3) = \Gamma(1+3)/(\Gamma(1)*\Gamma(3)) = 3$

4. $c = f(x^*) = 3 * (1-x^*)^2 = 3 * 1 = 3$

CASE-II

1. ALPHA_1 = 2, ALPHA_2 = 2



2. $x^* = (\alpha_1 - 1)/(\alpha_1 + \alpha_2 - 2) = (2-1)/(2+2-2) = 0.5$

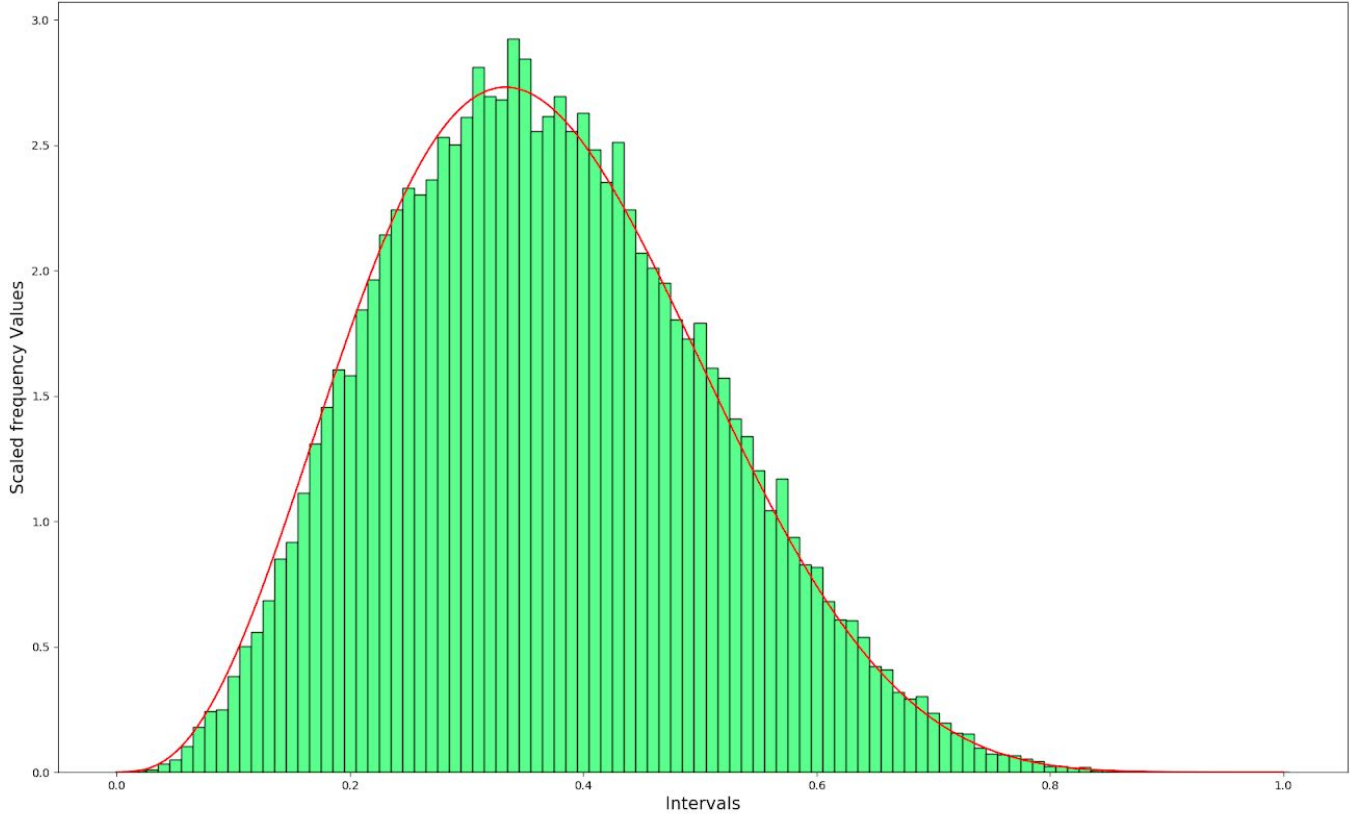
3. $1/B(2,2) = \Gamma(1+3)/(\Gamma(1)*\Gamma(3)) = 6$

4. $c = f(x^*) = 6 * (x^*) * (1-x^*) = 6 * 0.5 * 0.5 = 1.5$

CASE-III

1. ALPHA_1 = 4, ALPHA_2 = 7

Histogram showing Frequencies of Generated Numbers
Value of $c = 2.731290961743638$:::: Avg number of times steps 1 repeated = 2.72094
Average value of Generated Numbers = 0.3642567775903352
Number of generated numbers = 36752
 $\alpha_1 = 4$; $\alpha_2 = 7$



2. $x^* = (\alpha_1 - 1)/(\alpha_1 + \alpha_2 - 2) = (4-1)/(4+7-2) = 0.3333333...$

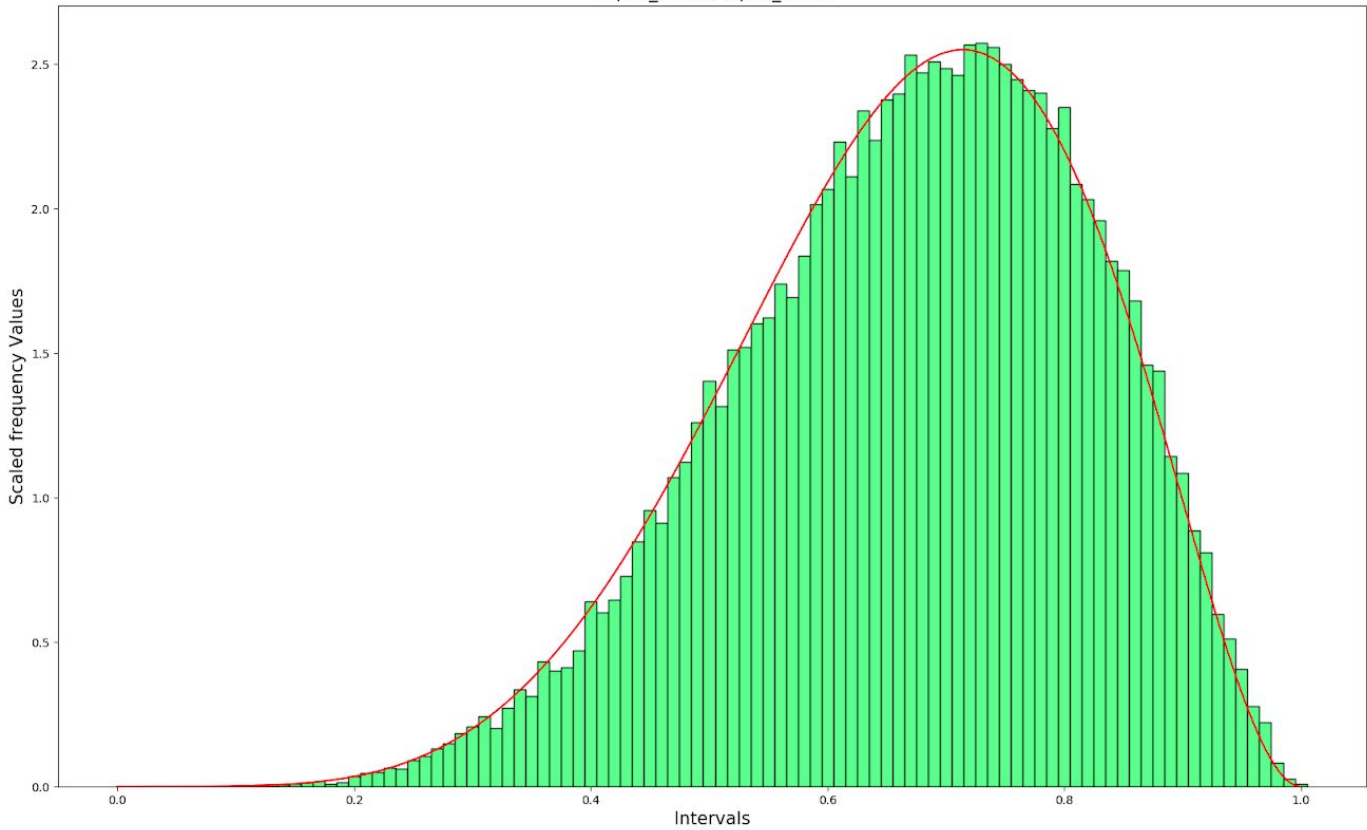
3. $1/B(4,7) = \Gamma(4+7)/(\Gamma(4)\Gamma(7)) = 840$

4. $c = f(x^*) = 840 * (x^*)^3 * (1-x^*)^6 = 2.731290961743638$

CASE-IV

1. ALPHA_1 = 6, ALPHA_2 = 3

Histogram showing Frequencies of Generated Numbers
Value of $c = 2.549957925694226$:::: Avg number of times steps 1 repeated = 2.53824
Average value of Generated Numbers = 0.6669460060410691
Number of generated numbers = 39397
 $\alpha_1 = 6$; $\alpha_2 = 3$



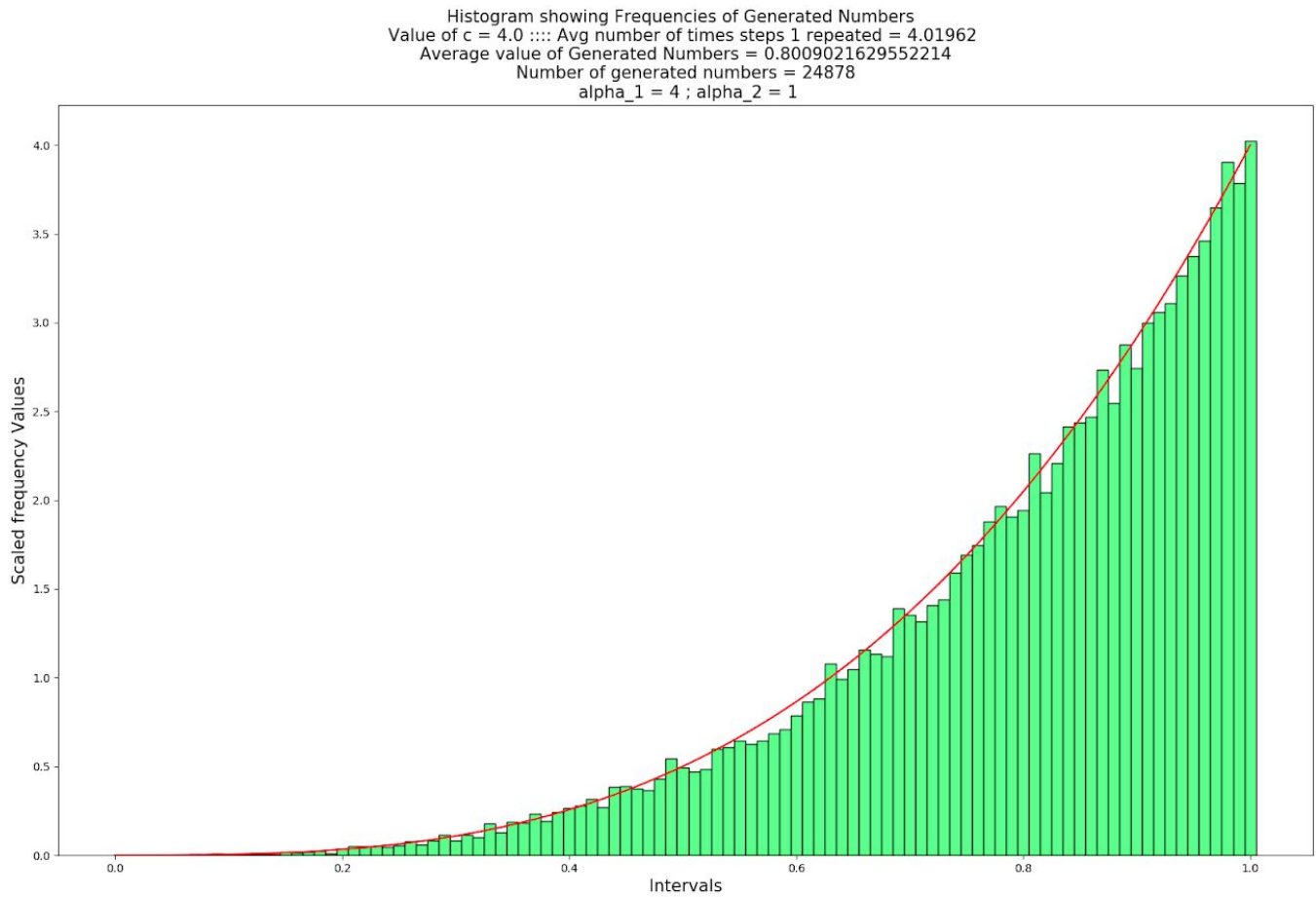
2. $x^* = (\alpha_1 - 1)/(\alpha_1 + \alpha_2 - 2) = (6-1)/(6+3-2) = 0.7142857142857143$

3. $1/B(6,3) = \Gamma(6+3)/(\Gamma(6)\Gamma(3)) = 168$

4. $f(x^*) = 168 * (x^*)^5 * (1-x^*)^2 = 2.549957925694226$

CASE-V

1. ALPHA_1 = 4, ALPHA_2 = 1



2. $x^* = (\alpha_1 - 1)/(\alpha_1 + \alpha_2 - 2) = (4-1)/(4+1-2) = 1$

3. $1/B(4,1) = \Gamma(4+1)/(\Gamma(4)*\Gamma(1)) = 4$

4. $c = f(x^*) = 4 * (x^*) * (1-x^*) = 4$

CONCLUSION

1. When $\alpha_1 < \alpha_2$, average of numbers generated is less than 0.5 and also peak of graph is achieved at $x^* < 0.5$
2. When $\alpha_1 > \alpha_2$, average of numbers generated is greater than 0.5 and also peak of graph is achieved at $x^* > 0.5$.
3. When $\alpha_1 = \alpha_2$, the average of numbers generated is approximately 0.5 and also the peak of the graph is achieved at $x^* = 0.5$.