

MS IA-1  
Name: Arya Nair  
Roll Number: 16010421063  
Branch: IT  
Division: A  
Batch: A2

**a. To simulate rolling a six-sided die 100 times.**

1) Creating required tables and naming the columns

G19												
	A	B	C	D	E	F	G	H	I	J	K	L
1												
2	Arya Nair 16010421063 A2 MS IA-1											
3												
4												
5	a. To simulate rolling a six-sided die 100 times.											
6												
7												
8												
9	Probability Distribution Table			Simulaton Table		Frequency Table						
10	Numbers on a die	Probability of occurent of each		Number of throws	Ocurrence	Digit	Frequency of occurrence of each digit					
11												
12												
13												
14												
15												
16												
17												
18												
19												
20												
21												
22												
23												

2) Applying Formulae to generate-

	A	B	C	D	E	F	G	H	I	J
1										
2	Arya Nair 16010421063 A2 MS IA-1									
3										
4										
5	a. To simulate rolling a six-sided die 100 times.									
6										
7										
8										
9	Probability Distribution Table			Simulaton Table			Frequency Table			
10	Numbers on a die	Probability of occurent of each		Number of throws	Ocurrence		Digit	Frequency of occurrence of each digit		
11	1									
12	=A11+1									
13										
14										
15										
16										
17										
18										
19										
20										
21										

Dragging down

	A	B	C	D	E	F	G	H	I	J	K
1											
2	Arya Nair 16010421063 A2 MS IA-1										
3											
4											
5	a. To simulate rolling a six-sided die 100 times.										
6											
7											
8											
9	Probability Distribution Table			Simulaton Table			Frequency Table				
10	Numbers on a die	Probability of occurent of each		Number of throws	Ocurrence		Digit	Frequency of occurrence of each digit			
11	1										
12	2										
13	3										
14	4										
15	5										
16	6										
17											
18											
19											

Probability of occurrence of each number =  $1/6$  -

B22										
	A	B	C	D	E	F	G	H	I	J
1										
2	Arya Nair 16010421063 A2 MS IA-1									
3										
4										
5	a. To simulate rolling a six-sided die 100 times.									
6										
7										
8										
9	Probability Distribution Table		Simulaton Table		Frequency Table					
10	Numbers on a die	Probability of occurent of each		Number of throws	Ocurrence		Digit	Frequency of occurrence of each digit		
11	1	0.1666666667								
12	2	0.1666666667								
13	3	0.1666666667								
14	4	0.1666666667								
15	5	0.1666666667								
16	6	0.1666666667								
17										
18										
19										

Number of throws (D11+1)-

	A	B	C	D	E	F	G	H	I	J
1										
2										
3										
4										
5										
6										
7										
8										
9	Probability Distribution Table			Simulaton Table			Frequency Table			
10	Numbers on a die	Probability of occurent of each		Number of throws	Ocurrence		Digit	Frequency of occurrence of each digit		
11	1	0.1666666667		1						
12	2	0.1666666667		2						
13	3	0.1666666667		3						
14	4	0.1666666667		4						
15	5	0.1666666667		5						
16	6	0.1666666667		6						
17				7						
18				8						
19				9						
20				10						
21				11						

	A	B	C	D	E	F	G	H	I	J	K	L	M
85				75									
86				76									
87				77									
88				78									
89				79									
90				80									
91				81									
92				82									
93				83									
94				84									
95				85									
96				86									
97				87									
98				88									
99				89									
100				90									
101				91									
102				92									
103				93									
104				94									
105				95									
106				96									
107				97									
108				98									
109				99									
110				100									
111													

Occurrence –

For occurrence, we will use the “Data Analytics” tool pack in excel.

Selecting Data Analysis option –

G100

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
1																	
2	Arya Nair 16010421063 A2 MS IA-1																
3																	
4																	
5	a. To simulate rolling a six-sided die 100 times.																
6																	
7																	
8																	
9	Probability Distribution Table		Simulaton Table														
10	Numbers on a die	Probability of occurent of each		Number of throws	Occurence		Digit										
11	1	0.1666666667		1													
12	2	0.1666666667		2													
13	3	0.1666666667		3													
14	4	0.1666666667		4													
15	5	0.1666666667		5													
16	6	0.1666666667		6													
17				7													
18				8													
19				9													
20				10													
21				11													
22				12													
23				13													
24				14													
25				15													
26				16													
27				17													

Data Analysis

Analysis Tools

- Covariance
- Descriptive Statistics
- Exponential Smoothing
- F-Test Two-Sample for Variances
- Fourier Analysis
- Histogram
- Moving Average
- Random Number Generation
- Rank and Percentile
- Regression

OK Cancel Help

A11

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
1																	
2	Arya Nair 16010421063 A2 MS IA-1																
3																	
4																	
5	a. To simulate rolling a six-sided die 100 times.																
6																	
7																	
8																	
9	Probability Distribution Table		Simulaton Table														
10	Numbers on a die	Probability of occurent of each		Number of throws	Occurence		Digit										
11	1	0.1666666667		1													
12	2	0.1666666667		2													
13	3	0.1666666667		3													
14	4	0.1666666667		4													
15	5	0.1666666667		5													
16	6	0.1666666667		6													
17				7													
18				8													
19				9													
20				10													
21				11													
22				12													
23				13													
24				14													
25				15													
26				16													
27				17													

Random Number Generation

Number of Variables: 1

Number of Random Numbers: 100

Distribution: Discrete

Parameters

Value and Probability Input Range: \$A\$11:\$B\$16

Random Seed:

Output options

☐ Output Range:

☒ New Worksheet Ply:

☐ New Workbook

OK Cancel Help

Random Number Generation dialog box is open over a spreadsheet. The dialog box settings are:

- Number of Variables: 1
- Number of Random Numbers: 100
- Distribution: Discrete
- Parameters: Value and Probability Input Range: \$A\$11:\$B\$16
- Random Seed: (empty)
- Output options: ☒ Output Range: \$E\$11:\$E\$110, ☐ New Worksheet Ply, ☐ New Workbook

The spreadsheet shows columns A through N and rows 85 through 112. A range of cells from D85 to D110 is highlighted with a green dashed border.

Spreadsheet content for simulation of rolling a six-sided die 100 times.

**Arya Nair 16010421063 A2 MS IA-1**

**a. To simulate rolling a six-sided die 100 times.**

Probability Distribution Table		Simulaton Table		Frequency Table	
Numbers on a die	Probability of occurent of each	Number of throws	Ocurrence	Digit	Frequency of occurrence of each digit
1	0.166666667	1	1		
2	0.166666667	2	2		
3	0.166666667	3	1		
4	0.166666667	4	2		
5	0.166666667	5	6		
6	0.166666667	6	4		
		7	5		
		8	6		
		9	1		
		10	3		
		11	1		
		12	1		
		13	3		
		14	3		
		15	4		
		16	1		

Frequency & digit – We are doing this to tally our answer which we will get from histogram.  
This step can be excluded.

H21										
	A	B	C	D	E	F	G	H	I	J
1										
2	Arya Nair 16010421063 A2 MS IA-1									
3										
4										
5	a. To simulate rolling a six-sided die 100 times.									
6										
7										
8										
9	Probability Distribution Table			Simulaton Table			Frequency Table			
10	Numbers on a die	Probability of occurent of each		Number of throws	Ocurrence		Digit	Frequency of occurrence of each digit		
11	1	0.1666666667		1	1		1			
12	2	0.1666666667		2	2		2			
13	3	0.1666666667		3	1		3			
14	4	0.1666666667		4	2		4			
15	5	0.1666666667		5	6		5			
16	6	0.1666666667		6	4		6			
17				7	5					
18				8	6					
19				9	1					
20				10	3					
21				11	1					
22				12	1					
23				13	3					
24				14	3					

Frequency of occurrence of each digit –

We will use “COUNTIF” function of excel to calculate frequency of each digit.

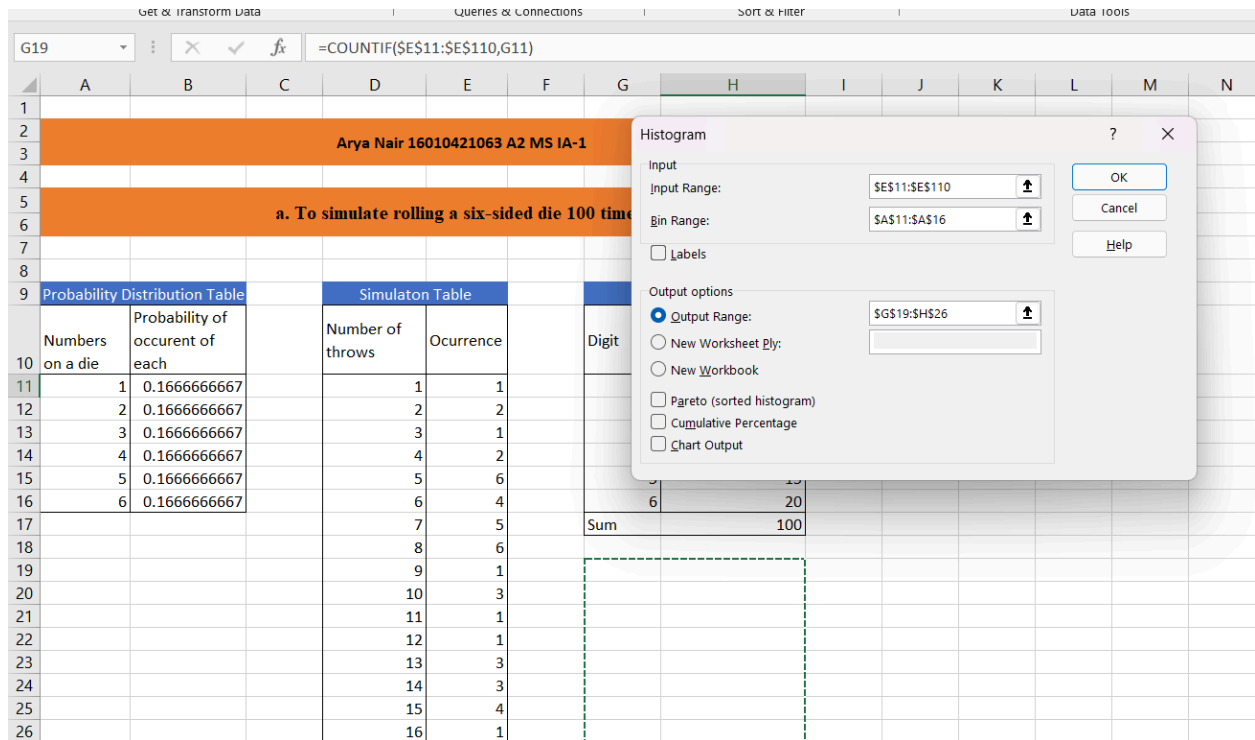
Clipboard		Font		Alignment		Number		Format			
H11		:				=COUNTIF(\$E\$11:\$E\$110,G11)					
	A	B	C	D	E	F	G	H	I	J	K
2	Arya Nair 16010421063 A2 MS IA-1										
3											
4											
5	a. To simulate rolling a six-sided die 100 times.										
6											
7											
8											
9	Probability Distribution Table		Simulaton Table				Frequency Table				
10	Numbers on a die	Probability of occurent of each		Number of throws	Ocurrence		Digit	Frequency of occurrence of each digit			
11	1	0.1666666667		1	1		1	25			
12	2	0.1666666667		2	2		2	13			
13	3	0.1666666667		3	1		3	16			
14	4	0.1666666667		4	2		4	11			
15	5	0.1666666667		5	6		5	15			
16	6	0.1666666667		6	4		6	20			
17				7	5		Sum	100	(Ctrl)		
18				8	6						
19				9	1						
20				10	3						
21				11	1						

### 3) Creating a Histogram

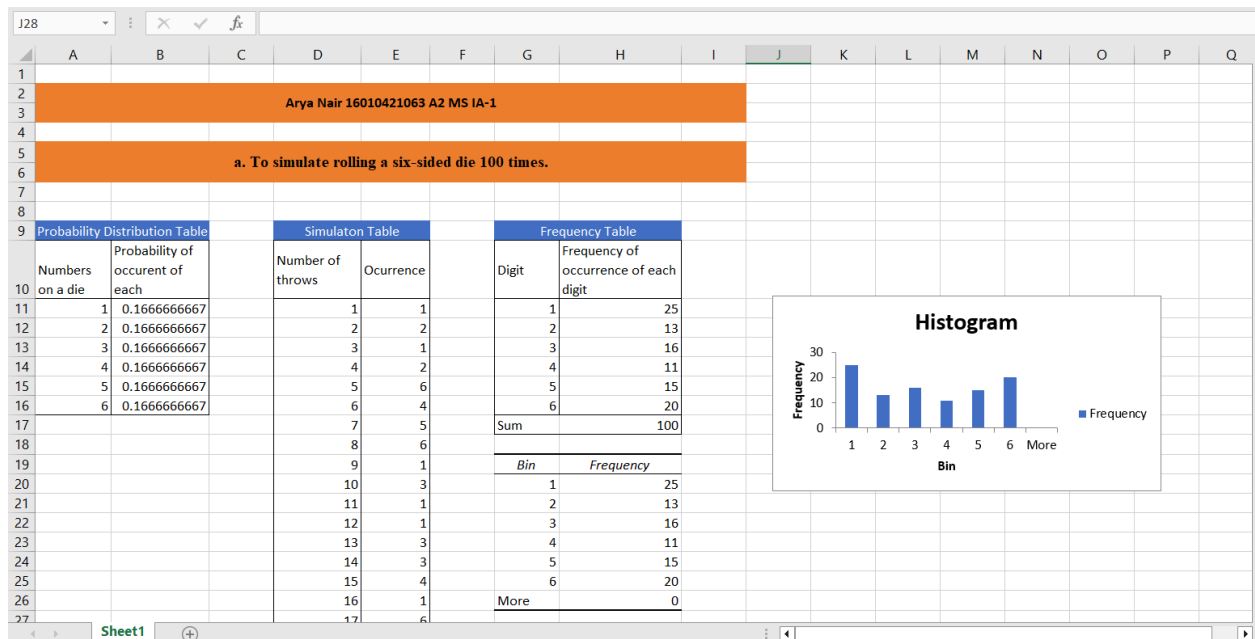
For this again we will use “Data Analysis” tool pack in excel.

H11	=COUNTIF(\$E\$11:\$E\$110,G11)															
	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
2	Arya Nair 16010421063 A2 MS IA-1															
3																
4																
5	a. To simulate rolling a six-sided die 100 times															
6																
7																
8																
9	Probability Distribution Table		Simulaton Table													
10	Numbers on a die	Probability of occurent of each		Number of throws	Ocurrence		Digit									
11	1	0.1666666667		1	1											
12	2	0.1666666667		2	2											
13	3	0.1666666667		3	1											
14	4	0.1666666667		4	2		4	11								
15	5	0.1666666667		5	6		5	15								
16	6	0.1666666667		6	4		6	20								
17				7	5		Sum	100								
18				8	6											
19				9	1											
20				10	3											
21				11	1											
22				12	1											
23				13	3											
24				14	3											
25				15	4											

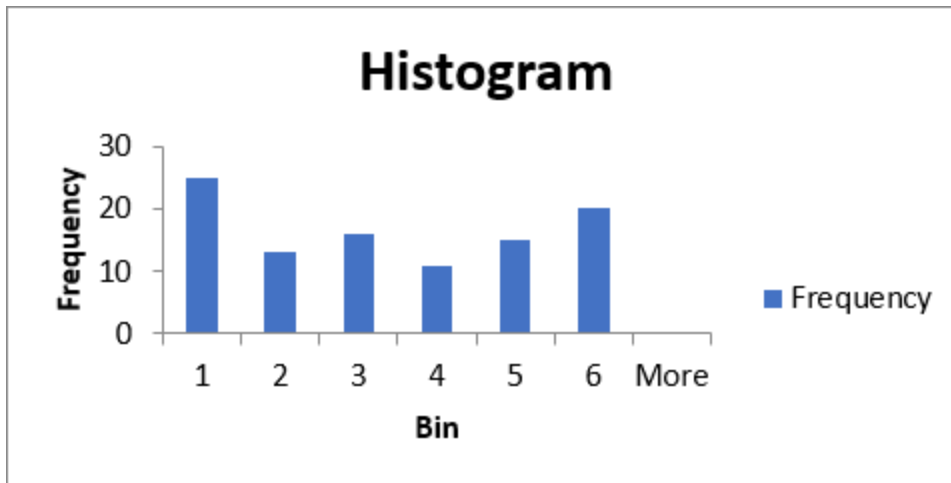




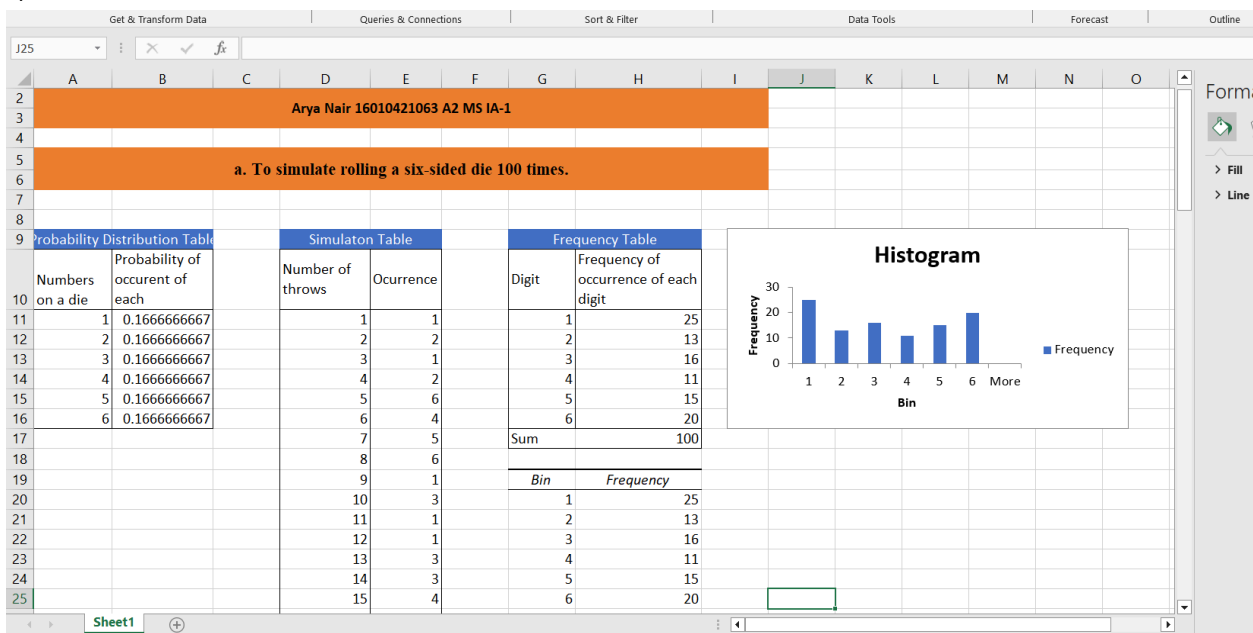
After clicking on ok



This is the final histogram



#### 4) Final



d. To simulate rolling two six-sided dice and recording the sum 250 times.

1) Creating required tables and naming the columns



- 3) Based on the sum table, we can calculate the probability of occurrence of sum of each digit for numbers from 2-12 –

Arya Nair 16010421063 A2 MS 1A-1															
d. To simulate rolling two six-sided dice and recording the sum 250 times.															
Probability distribution Table			Simulation Table		Sum Table										
Sum of numbers on 2 die	Probability		Number of throws	Sum		1	2	3	4	5	6				
2	0.03				1	2	3	4	5	6	7				
3	0.06				2	3	4	5	6	7	8				
4	0.08				3	4	5	6	7	8	9				
5	0.11				4	5	6	7	8	9	10				
6	0.14				5	6	7	8	9	10	11				
7	0.14				6	7	8	9	10	11	12				
8	0.17														
9	0.11														
10	0.08														
11	0.06														
12	0.03														

As seen from the sum table, there are total 36 possibilities. We count the number of times each digit has appeared and then divide it by 36 to get the probability.

- 4) Applying Formulae to generate-

Number of throws –

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
1															
2	Arya Nair 16010421063 A2 MS IA-1														
3															
4															
5	d. To simulate rolling two six-sided dice and recording the sum 250 times.														
6															
7															
8															
9	Probability distribution Table			Simulation Table			Sum Table								
10	Sum of numbers on 2 die	Probability		Number of throws	Sum										
11	2	0.03		1			1	2	3	4	5	6	7		
12	3	0.06		2			2	3	4	5	6	7	8		
13	4	0.08		3			3	4	5	6	7	8	9		
14	5	0.11		4			4	5	6	7	8	9	10		
15	6	0.14		5			5	6	7	8	9	10	11		
16	7	0.14		6			6	7	8	9	10	11	12		
17	8	0.17		7			7	8	9	10	11	12			
18	9	0.11		8											
19	10	0.08		9											
20	11	0.06		10											
21	12	0.03		11											
22				12											
23				13											
24				14											
25				15											
26				16											
27				17											
28				18											

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
233				223											
234				224											
235				225											
236				226											
237				227											
238				228											
239				229											
240				230											
241				231											
242				232											
243				233											
244				234											
245				235											
246				236											
247				237											
248				238											
249				239											
250				240											
251				241											
252				242											
253				243											
254				244											
255				245											
256				246											
257				247											
258				248											
259				249											
260				250											
261															

Sum –

To simulate the sum, we will use the “Data Analytics” tool kit of excel.

Excel spreadsheet showing a simulation setup for rolling two six-sided dice 250 times. The spreadsheet includes a title bar, a formula bar, and a grid of cells. A blue header row is present at the top. A blue box highlights the instruction: "d. To simulate rolling two six-sided dice and recording the sum 250 times." Below this, there are three tables: "Probability distribution Table", "Simulation Table", and "Sum Table".

Sum of numbers on 2 die	Probability
2	0.03
3	0.06
4	0.08
5	0.11
6	0.14
7	0.14
8	0.17
9	0.11
10	0.08
11	0.06
12	0.03

Number of throws	Sum
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	
15	
16	
17	
18	
19	
20	
21	
22	
23	
24	
25	
26	
27	
28	
29	
30	
31	
32	
33	
34	
35	
36	
37	
38	
39	
40	
41	
42	
43	
44	
45	
46	
47	
48	
49	

1	2	3	4	5	6
1	2	3	4	5	6
2	3	4	5	6	7
3	4	5	6	7	8
4	5	6	7	8	9
5	6	7	8	9	10
6	7	8	9	10	11

A "Data Analysis" dialog box is open, showing a list of analysis tools. The "Random Number Generation" tool is selected.

Excel spreadsheet showing the results of the simulation. The spreadsheet includes a title bar, a formula bar, and a grid of cells. A blue header row is present at the top. A blue box highlights the instruction: "d. To simulate rolling two six-sided dice and recording the sum 250 times." Below this, there are three tables: "Probability distribution Table", "Simulation Table", and "Sum Table".

Sum of numbers on 2 die	Probability
2	0.03
3	0.06
4	0.08
5	0.11
6	0.14
7	0.14
8	0.17
9	0.11
10	0.08
11	0.06
12	0.03

Number of throws	Sum
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	
15	
16	
17	
18	
19	
20	
21	
22	
23	
24	
25	
26	
27	
28	
29	
30	
31	
32	
33	
34	
35	
36	
37	
38	
39	
40	
41	
42	
43	
44	
45	
46	
47	
48	
49	

1	2	3	4	5	6
1	2	3	4	5	6
2	3	4	5	6	7
3	4	5	6	7	8
4	5	6	7	8	9
5	6	7	8	9	10
6	7	8	9	10	11

A "Random Number Generation" dialog box is open, showing the configuration for generating random numbers. The "Number of variables" is set to 1, and the "Number of Random Numbers" is set to 250. The "Distribution" is set to "Discrete". The "Parameters" section shows the "Value and Probability Input Range" as "SAS11:SAS21". The "Output options" section shows the "Output Range" as "SAS11:SAS280".

After clicking on “OK” , random numbers for sum get generated–

F29																
	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	
1																
2	Arya Nair 16010421063 A2 MS IA-1															
3																
4																
5	d. To simulate rolling two six-sided dice and recording the sum 250 times.															
6																
7																
8																
9	Probability distribution Table		Simulation Table		Sum Table											
10	Sum of numbers on 2 die	Probability	Number of throws	Sum												
11	2	0.03	1	6												
12	3	0.06	2	3												
13	4	0.08	3	11												
14	5	0.11	4	10												
15	6	0.14	5	3												
16	7	0.14	6	4												
17	8	0.17	7	6												
18	9	0.11	8	8												
19	10	0.08	9	8												
20	11	0.06	10	7												
21	12	0.03	11	10												
22			12	7												
23			13	2												
24			14	8												
25			15	4												
26			16	7												
27			17	8												
28			18	8												
29			19	6												
30			20	8												
31			21	7												
32			22	3												
33			23	7												
34			24	6												

## 5) Creating a histogram

For creating histogram, we will again use “Data Analysis” tool pack in excel.

G22

Arya Nair 16010421063 A2 MS IA-1

d. To simulate rolling two six-sided dice and recording the sum 250 times.

Probability distribution Table		Simulation Table		Sum Table					
Sum of numbers on 2 die	Probability	Number of throws	Sum	1	2	3	4	5	6
2	0.03	1	6	1	2	3	4	5	6
3	0.06	2	3	2	3	4	5	6	7
4	0.08	3	11	3	4	5	6	7	8
5	0.11	4	10	4	5	6	7	8	9
6	0.14	5	3	5	6	7	8	9	10
7	0.14	6	4	6	7	8	9	10	11
8	0.17	7	6	7	8	9	10	11	12
9	0.11	8	8	8	9	10	11	12	13
10	0.08	9	8	9	10	11	12	13	14
11	0.06	10	7	10	11	12	13	14	15
12	0.03	11	10	11	12	13	14	15	16
		12	7	12	13	14	15	16	17
		13	2	13	14	15	16	17	18
		14	8	14	15	16	17	18	19
		15	4	15	16	17	18	19	20
		16	7	16	17	18	19	20	21
		17	8	17	18	19	20	21	22
		18	8	18	19	20	21	22	23
		19	6	19	20	21	22	23	24
		20	8	20	21	22	23	24	25
		21	7	21	22	23	24	25	26
		22	10	22	23	24	25	26	27
		23	3	23	24	25	26	27	28
		24	6	24	25	26	27	28	29
		25	10	25	26	27	28	29	30
		26	7	26	27	28	29	30	31
		27	12	27	28	29	30	31	32
		28	4	28	29	30	31	32	33
		29	9	29	30	31	32	33	34
		30	9	30	31	32	33	34	35
		31	7	31	32	33	34	35	36
		32	6	32	33	34	35	36	37
		33	9	33	34	35	36	37	38
		34	6	34	35	36	37	38	39
		35	8	35	36	37	38	39	40
		36	7	36	37	38	39	40	41
		37	6	37	38	39	40	41	42
		38	4	38	39	40	41	42	43
		39	9	39	40	41	42	43	44
		40	9	40	41	42	43	44	45
		41	7	41	42	43	44	45	46
		42	6	42	43	44	45	46	47
		43	9	43	44	45	46	47	48
		44	6	44	45	46	47	48	49
		45	8	45	46	47	48	49	50
		46	7	46	47	48	49	50	51
		47	6	47	48	49	50	51	52
		48	4	48	49	50	51	52	53

Data Analysis

Analysis Tools

- Anova: Single Factor
- Anova: Two-Factor With Replication
- Anova: Two-Factor Without Replication
- Correlation
- Covariance
- Descriptive Statistics
- Exponential Smoothing
- F-Test Two-Sample for Variances
- Fourier Analysis
- Histogram**

OK Cancel Help

Selecting output range –

K25

Arya Nair 16010421063 A2 MS IA-1

d. To simulate rolling two six-sided dice and recording the sum 250 times.

Probability distribution Table		Simulation Table		Sum Table					
Sum of numbers on 2 die	Probability	Number of throws	Sum	1	2	3	4	5	6
2	0.03	1	6	1	2	3	4	5	6
3	0.06	2	3	2	3	4	5	6	7
4	0.08	3	11	3	4	5	6	7	8
5	0.11	4	10	4	5	6	7	8	9
6	0.14	5	3	5	6	7	8	9	10
7	0.14	6	4	6	7	8	9	10	11
8	0.17	7	6	7	8	9	10	11	12
9	0.11	8	8	8	9	10	11	12	13
10	0.08	9	8	9	10	11	12	13	14
11	0.06	10	7	10	11	12	13	14	15
12	0.03	11	10	11	12	13	14	15	16
		12	7	12	13	14	15	16	17
		13	2	13	14	15	16	17	18
		14	8	14	15	16	17	18	19
		15	4	15	16	17	18	19	20
		16	7	16	17	18	19	20	21
		17	8	17	18	19	20	21	22
		18	8	18	19	20	21	22	23
		19	6	19	20	21	22	23	24
		20	8	20	21	22	23	24	25
		21	7	21	22	23	24	25	26
		22	10	22	23	24	25	26	27
		23	3	23	24	25	26	27	28
		24	6	24	25	26	27	28	29
		25	10	25	26	27	28	29	30
		26	7	26	27	28	29	30	31
		27	12	27	28	29	30	31	32
		28	4	28	29	30	31	32	33
		29	9	29	30	31	32	33	34
		30	9	30	31	32	33	34	35
		31	7	31	32	33	34	35	36
		32	6	32	33	34	35	36	37
		33	9	33	34	35	36	37	38
		34	6	34	35	36	37	38	39
		35	8	35	36	37	38	39	40
		36	7	36	37	38	39	40	41
		37	6	37	38	39	40	41	42
		38	4	38	39	40	41	42	43
		39	9	39	40	41	42	43	44
		40	9	40	41	42	43	44	45
		41	7	41	42	43	44	45	46
		42	6	42	43	44	45	46	47
		43	9	43	44	45	46	47	48
		44	6	44	45	46	47	48	49

Histogram

Input

Input Range: SES11:SES260

Bin Range: SAS11:SAS21

☐ Labels

Output options

☒ Output Range: SGE19:SGS24

☐ New Worksheet Ply:

☐ New Workbook

☐ Pareto (sorted histogram)

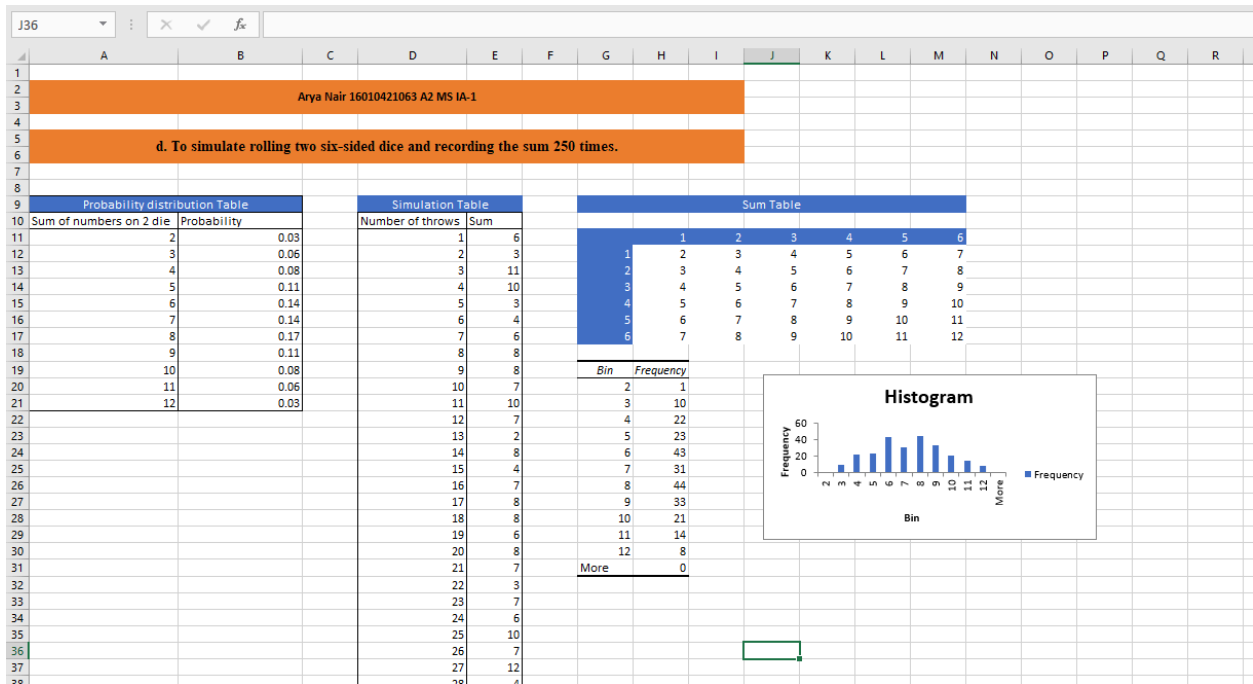
☐ Cumulative Percentage

☒ Chart Output

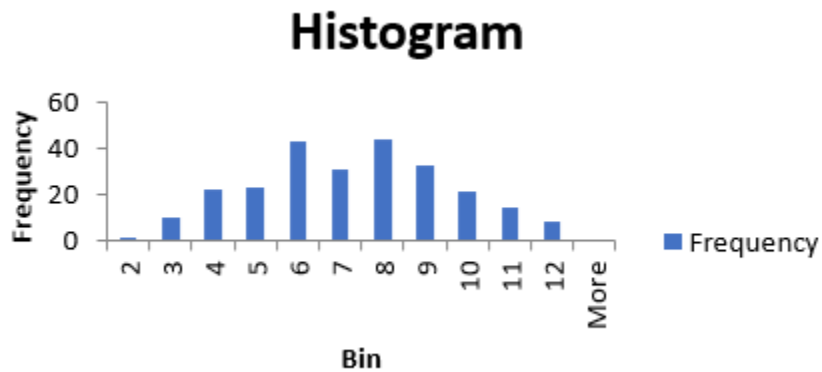
OK Cancel Help

After clicking on OK-





Final Histogram



6) Final

