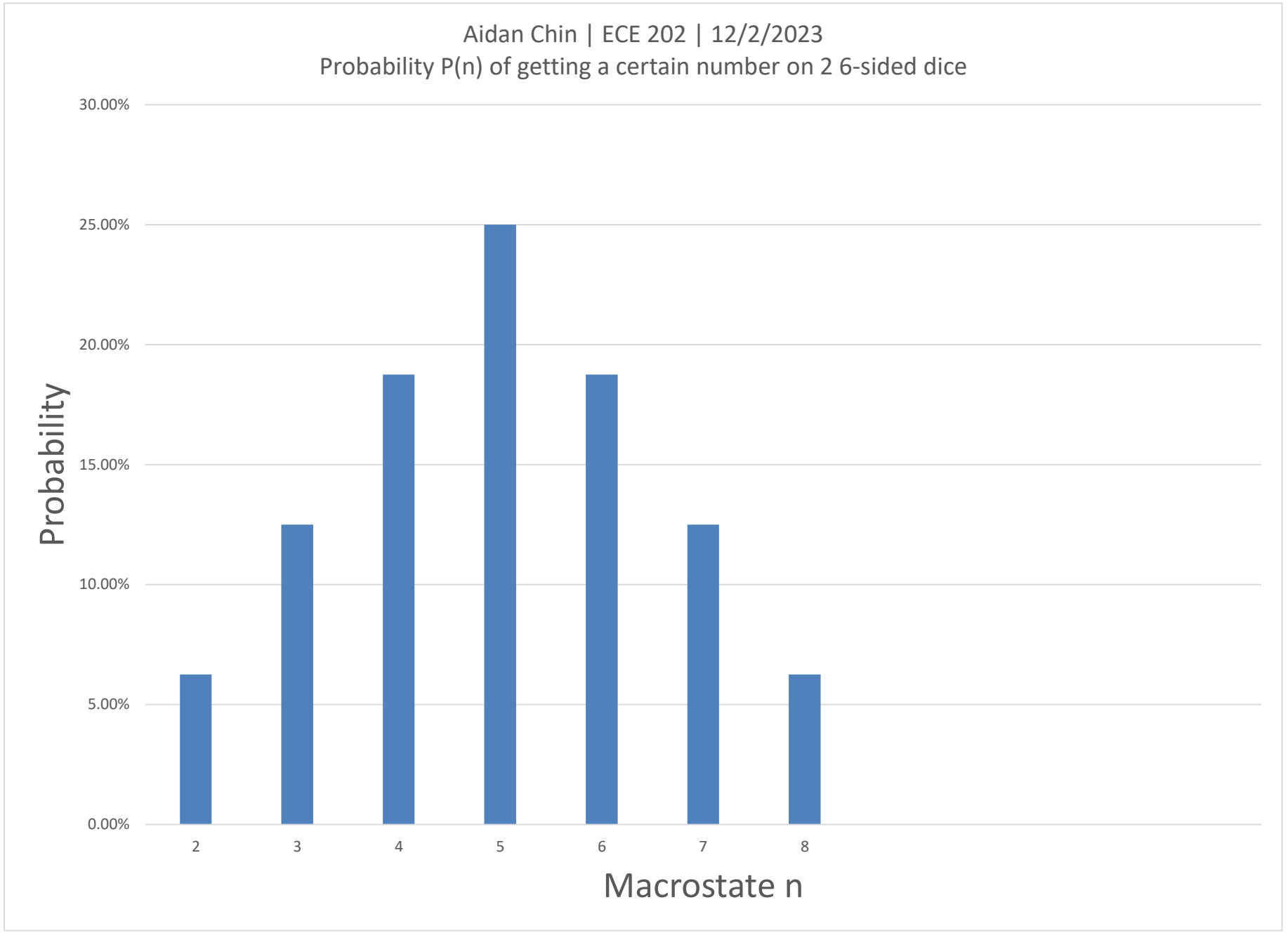
	A	B	C	D	E	F	G	H	I	J	K	L	M	N
1	Aidan Chin													
2	ECE 202 E7													
3	12/2/2023													
4	this excel doc calculates the probability of getting a certain number from a 2 dice roll with either 4 or 6 sides								Sum of both dice					
5							Die 1	6	7	8	9	10	11	12
6	States of 1 die	Probability P(n)						5	6	7	8	9	10	11
7	1	16.67%						4	5	6	7	8	9	10
8	2	16.67%						3	4	5	6	7	8	9
9	3	16.67%						2	3	4	5	6	7	8
10	4	16.67%						1	2	3	4	5	6	7
11	5	16.67%							1	2	3	4	5	6
12	6	16.67%							Die 2					
13														
14	Number of dice (N)	2	USER INPUT = BLUE											
15	Number of sides (S)	6												
16	(predict) Number of microstates (n)	36	OUTPUT = ORANGE											
17	(predict) Number of macrostates	11												
18														
19	macrostate n (total # on both dice)	# of microstates	Probability P(n)											
20	2	1	2.78%											
21	3	2	5.56%											
22	4	3	8.33%											
23	5	4	11.11%											
24	6	5	13.89%											
25	7	6	16.67%											
26	8	5	13.89%											
27	9	4	11.11%											
28	10	3	8.33%											
29	11	2	5.56%											
30	12	1	2.78%											
31														
32	CHECK total # of macrostates	CHECK total # of microstates	CHECK total probability											
33	0	0	100.00%											
34	Should be zero	should be zero	should be 100%											
35														
36	Most likely macrostate	7												

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
1	Arban Chin													
2	ICE 202 E7													
3	41262													
4														
5		this excel doc calculates the probability of getting a certain number from a 2 dice roll with either 4 or 6 sides							Sum of both dice					
6							Die 1	=IF(H6<>"",IF(G6<5,H6+1,H6+3,""),"")	=IF(SH5<>"",IF(G11<>"",$H5+$I11,""),"")	=IF($H5<>"",IF(J11<>"",$H5+$J11,""),"")	=IF($H5<>"",IF(K11<>"",$H5+$K11,""),"")	=IF($H5<>"",IF(L11<>"",$H5+$L11,""),"")	=IF($H5<>"",IF(M11<>"",$H5+$M11,""),"")	=IF($H5<>"",IF(N11<>"",$H5+N$11,""),"")
7	States of 1 die	Probability P(n)						=IF(H7<>"",IF(G6<5,H7+1,H7+3,""),"")	=IF($H6<>"",IF(G11<>"",$H6+$I11,""),"")	=IF($H6<>"",IF(J11<>"",$H6+$J11,""),"")	=IF($H6<>"",IF(K11<>"",$H6+$K11,""),"")	=IF($H6<>"",IF(L11<>"",$H6+$L11,""),"")	=IF($H6<>"",IF(M11<>"",$H6+$M11,""),"")	=IF($H6<>"",IF(N11<>"",$H6+N$11,""),"")
8	1	=IF(A7<>"",1/$B$15,"")						=IF(H8<>"",IF(G6<5,H8+1,H8+3,""),"")	=IF($H7<>"",IF(G11<>"",$H7+$I11,""),"")	=IF($H7<>"",IF(J11<>"",$H7+$J11,""),"")	=IF($H7<>"",IF(K11<>"",$H7+$K11,""),"")	=IF($H7<>"",IF(L11<>"",$H7+$L11,""),"")	=IF($H7<>"",IF(M11<>"",$H7+$M11,""),"")	=IF($H7<>"",IF(N11<>"",$H7+N$11,""),"")
9	=IF(A7<>"",IF(G$15>=A7+1,A7+1,""),"")	=IF(A8<>"",1/$B$15,"")						=IF(H9<>"",IF(G6<5,H9+1,H9+3,""),"")	=IF($H8<>"",IF(G11<>"",$H8+$I11,""),"")	=IF($H8<>"",IF(J11<>"",$H8+$J11,""),"")	=IF($H8<>"",IF(K11<>"",$H8+$K11,""),"")	=IF($H8<>"",IF(L11<>"",$H8+$L11,""),"")	=IF($H8<>"",IF(M11<>"",$H8+$M11,""),"")	=IF($H8<>"",IF(N11<>"",$H8+N$11,""),"")
10	=IF(A8<>"",IF(G$15>=A8+1,A8+1,""),"")	=IF(A9<>"",1/$B$15,"")						=IF(H10<>"",IF(G6<5,H10+1,H10+3,""),"")	=IF($H9<>"",IF(G11<>"",$H9+$I11,""),"")	=IF($H9<>"",IF(J11<>"",$H9+$J11,""),"")	=IF($H9<>"",IF(K11<>"",$H9+$K11,""),"")	=IF($H9<>"",IF(L11<>"",$H9+$L11,""),"")	=IF($H9<>"",IF(M11<>"",$H9+$M11,""),"")	=IF($H9<>"",IF(N11<>"",$H9+N$11,""),"")
11	=IF(A9<>"",IF(G$15>=A9+1,A9+1,""),"")	=IF(A10<>"",1/$B$15,"")						1	=IF(SH10<>"",IF(G11<>"",$H10+$I11,""),"")	=IF($H10<>"",IF(J11<>"",$H10+$J11,""),"")	=IF($H10<>"",IF(K11<>"",$H10+$K11,""),"")	=IF($H10<>"",IF(L11<>"",$H10+$L11,""),"")	=IF($H10<>"",IF(M11<>"",$H10+$M11,""),"")	=IF($H10<>"",IF(N11<>"",$H10+N$11,""),"")
12	=IF(A10<>"",IF(G$15>=A10+1,A10+1,""),"")	=IF(A11<>"",1/$B$15,"")						1	=IF(I11<>"",IF(G$15>=I11+1,I11+1,""),"")	=IF(I11<>"",IF(J$15>=I11+1,I11+1,""),"")	=IF(I11<>"",IF(K$15>=I11+1,I11+1,""),"")	=IF(I11<>"",IF(L$15>=I11+1,I11+1,""),"")	=IF(I11<>"",IF(M$15>=I11+1,I11+1,""),"")	=IF(I11<>"",IF(N$15>=I11+1,M11+1,""),"")
13	=IF(A11<>"",IF(G$15>=A11+1,A11+1,""),"")	=IF(A12<>"",1/$B$15,"")							Die 2					
14														
15	Number of dice (N)	2	USER INPUT = BLUE											
16	Number of sides (S)	6												
17	[predict] Number of microstates (n)	=B15^B14	OUTPUT = ORANGE											
18	[predict] Number of macrostates	=B14*(B15-1)+1												
19														
20	macrostate n (total # on both dice)	# of microstates	Probability P(n)											
21	=B14	=IF(COUNTIF(INDIRECT("'&{11-$B$15}!INDIRECT(CHAR(CODE("')+$B$15-1)&"10"),A20)=0,"",COUNTIF(INDIRECT("'&{11-$B$15}!INDIRECT(CHAR(CODE("')+$B$15-1)&"10"),A20))	=IF(B20<>"",B20/$B$16,"")											
22	=IF(A20<>"",IF($B$14*$B$15>=A20+1,A20+1,""),"")	=IF(COUNTIF(INDIRECT("'&{11-$B$15}!INDIRECT(CHAR(CODE("')+$B$15-1)&"10"),A21)=0,"",COUNTIF(INDIRECT("'&{11-$B$15}!INDIRECT(CHAR(CODE("')+$B$15-1)&"10"),A21))	=IF(B21<>"",B21/$B$16,"")											
23	=IF(A21<>"",IF($B$14*$B$15>=A21+1,A21+1,""),"")	=IF(COUNTIF(INDIRECT("'&{11-$B$15}!INDIRECT(CHAR(CODE("')+$B$15-1)&"10"),A22)=0,"",COUNTIF(INDIRECT("'&{11-$B$15}!INDIRECT(CHAR(CODE("')+$B$15-1)&"10"),A22))	=IF(B22<>"",B22/$B$16,"")											
24	=IF(A22<>"",IF($B$14*$B$15>=A22+1,A22+1,""),"")	=IF(COUNTIF(INDIRECT("'&{11-$B$15}!INDIRECT(CHAR(CODE("')+$B$15-1)&"10"),A23)=0,"",COUNTIF(INDIRECT("'&{11-$B$15}!INDIRECT(CHAR(CODE("')+$B$15-1)&"10"),A23))	=IF(B23<>"",B23/$B$16,"")											
25	=IF(A23<>"",IF($B$14*$B$15>=A23+1,A23+1,""),"")	=IF(COUNTIF(INDIRECT("'&{11-$B$15}!INDIRECT(CHAR(CODE("')+$B$15-1)&"10"),A24)=0,"",COUNTIF(INDIRECT("'&{11-$B$15}!INDIRECT(CHAR(CODE("')+$B$15-1)&"10"),A24))	=IF(B24<>"",B24/$B$16,"")											
26	=IF(A24<>"",IF($B$14*$B$15>=A24+1,A24+1,""),"")	=IF(COUNTIF(INDIRECT("'&{11-$B$15}!INDIRECT(CHAR(CODE("')+$B$15-1)&"10"),A25)=0,"",COUNTIF(INDIRECT("'&{11-$B$15}!INDIRECT(CHAR(CODE("')+$B$15-1)&"10"),A25))	=IF(B25<>"",B25/$B$16,"")											
27	=IF(A25<>"",IF($B$14*$B$15>=A25+1,A25+1,""),"")	=IF(COUNTIF(INDIRECT("'&{11-$B$15}!INDIRECT(CHAR(CODE("')+$B$15-1)&"10"),A26)=0,"",COUNTIF(INDIRECT("'&{11-$B$15}!INDIRECT(CHAR(CODE("')+$B$15-1)&"10"),A26))	=IF(B26<>"",B26/$B$16,"")											
28	=IF(A26<>"",IF($B$14*$B$15>=A26+1,A26+1,""),"")	=IF(COUNTIF(INDIRECT("'&{11-$B$15}!INDIRECT(CHAR(CODE("')+$B$15-1)&"10"),A27)=0,"",COUNTIF(INDIRECT("'&{11-$B$15}!INDIRECT(CHAR(CODE("')+$B$15-1)&"10"),A27))	=IF(B27<>"",B27/$B$16,"")											
29	=IF(A27<>"",IF($B$14*$B$15>=A27+1,A27+1,""),"")	=IF(COUNTIF(INDIRECT("'&{11-$B$15}!INDIRECT(CHAR(CODE("')+$B$15-1)&"10"),A28)=0,"",COUNTIF(INDIRECT("'&{11-$B$15}!INDIRECT(CHAR(CODE("')+$B$15-1)&"10"),A28))	=IF(B28<>"",B28/$B$16,"")											
30	=IF(A28<>"",IF($B$14*$B$15>=A28+1,A28+1,""),"")	=IF(COUNTIF(INDIRECT("'&{11-$B$15}!INDIRECT(CHAR(CODE("')+$B$15-1)&"10"),A29)=0,"",COUNTIF(INDIRECT("'&{11-$B$15}!INDIRECT(CHAR(CODE("')+$B$15-1)&"10"),A29))	=IF(B29<>"",B29/$B$16,"")											
31	=IF(A29<>"",IF($B$14*$B$15>=A29+1,A29+1,""),"")	=IF(COUNTIF(INDIRECT("'&{11-$B$15}!INDIRECT(CHAR(CODE("')+$B$15-1)&"10"),A30)=0,"",COUNTIF(INDIRECT("'&{11-$B$15}!INDIRECT(CHAR(CODE("')+$B$15-1)&"10"),A30))	=IF(B30<>"",B30/$B$16,"")											
32														
33	CHECK total # of macrostates	CHECK total # of microstates	CHECK total probability											
34	=B18-B14+COUNTA(A20:A30)-B17-COUNT(A20:A30)-B17)	=IF(B15=6,SUM(B20:B30)-B14,5/6*SUM(B20:B26)-B16)	=SUM(C20:C30)											
35	should be zero	should be zero	should be 100%											
36														
37	Most likely macrostate	=IF(B15=6,MODE(B5:N10),MODE(E7:L10))												


Aidan Chin | ECE 202 | 12/2/2023
Probability P(n) of getting a certain number on 2 6-sided dice
30.00%
25.00%
20.00%
15.00%
10.00%
5.00%
0.00%
Probability
2
3
4
5
6
7
8
Macrostate n