Basic Concepts of Probability

Liberal Arts Mathematics

Assignment Text

Answer the following problems from Section 7.5 of the textbook: 1, 2, 4, 5, 8, 9, 10, 23 – 25.
For reference, the text of the problems are duplicated below.
For the following exercises, we are considering two special 6-sided dice. Each face is labeled with a number and a letter: the first die has faces 1A, 1B, 2A, 2C, 4A, 4E; the second has faces 1A, 1A, 2A, 2B, 3A, 3C. Assume that each face has an equal probability of landing face up.
1. Use a table to identify the sample space of the experiment in which we roll both dice and note the sum of the two numbers that are showing.
2. What is the probability that we roll a sum less than 8?
4. What is the probability that we roll a sum less than or equal to 2?
5. What is the probability that we roll a sum greater than 2?
8. Use a table to identify the sample space of the experiment in which we roll both dice and note the two letters that are showing.
9. What is the probability that no As are showing?
10. What is the probability that at least one A is showing?

For the following exercises, use the following table of the top 15 players by number of plate appearances (PA) in the 2019 Major League Baseball season to assign empirical probabilities to the given events. A plate appearance is a batter's opportunity to try to get a hit. The other columns are runs scored (R), hits (H), doubles (2B), triples (3B), home runs (HR), walks (BB), and strike outs (SO).

Name	Team	PA	R	H	2B	3B	HR	BB	SO
Marcus Semien	OAK	747	123	187	43	7	33	87	102
Whit Merrifield	KCR	735	105	206	41	10	16	45	126
Ronald Acuna Jr.	ATL	715	127	175	22	2	41	76	188
Jonathan Villar	BAL	714	111	176	33	5	24	61	176
Mookie Betts	BOS	706	135	176	40	5	29	97	101
Rhys Hoskins	PHI	705	86	129	33	5	29	116	173
Jorge Polanco	MIN	704	107	186	40	7	22	60	116
Rafael Devers	BOS	702	129	201	54	4	32	48	119
Ozzie Albies	ATL	702	102	189	43	8	24	54	112
Eduardo Escobar	ARI	699	94	171	29	10	35	50	130
Xander Bogaerts	BOS	698	110	190	52	0	33	76	122
José Abreu	CHW	693	85	180	38	1	33	36	152
Pete Alonso	NYM	693	103	155	30	2	53	72	183
Freddie Freeman	ATL	692	113	176	34	2	38	87	127
Alex Bregman	HOU	690	122	164	37	2	41	119	83

23. Mookie Betts gets a home run in his next plate appearance.

24. Xander Bogaerts strikes out in his next plate appearance.

25. Jonathan Villar gets a hit in his next plate appearance.

Answer Key

1.

	1A	1A	2A	2B	3A	3C
1A	2	2	3	3	4	4
1B	2	2	3	3	4	4
2A	3	3	4	4	5	5
2C	3	3	4	4	5	5
4A	5	5	6	6	7	7
4E	5	5	6	6	7	7

2. 1

4. $\frac{1}{9}$

5. $\frac{8}{9}$

8.

	1A	1A	2A	2B	3A	3C
1A	AA	AA	AA	AB	AA	AC
1B	AB	AB	AB	BB	AB	BC
2A	AA	AA	AA	AB	AA	AC
2C	AC	AC	AC	BC	AC	CC
4A	AA	AA	AA	AB	AA	AC
4E	AE	AE	AE	BE	AE	CE

9. $\frac{1}{6}$

10. $\frac{5}{6}$

23. 0.041

24. 0.175

25. 0.246

Student Feedback Templates

#1 Should be

	1A	1A	2A	2B	3A	3C
1A	2	2	3	3	4	4
1B	2	2	3	3	4	4
2A	3	3	4	4	5	5
2C	3	3	4	4	5	5
4A	5	5	6	6	7	7
4E	5	5	6	6	7	7

#2 Should be 1 (All outcomes total less than 8)

#4 should be 1/9 (4 outcomes less than or equal to 2, 36 total outcomes, 4/36 reduces to 1/9)

#5 should be 8/9 (32 outcomes are greater than 2, 36 total outcomes, 32/36 reduces to 8/9)

#8 should be

	1A	1A	2A	2B	3A	3C
1A	AA	AA	AA	AB	AA	AC
1B	AB	AB	AB	BB	AB	BC
2A	AA	AA	AA	AB	AA	AC
2C	AC	AC	AC	BC	AC	CC
4A	AA	AA	AA	AB	AA	AC
4E	AE	AE	AE	BE	AE	CE

#9 should be 1/6 (6 outcomes do not have an A, 36 total outcomes, 6/36 reduces to 1/6)
#10 should be 5/6 (30 outcomes do have at least one A, 36 total outcomes, 30/36 reduces to 5/6)
#23 should be 0.041 (29 home runs, 706 plate appearances, 29/706 = 0.041 when rounded)
#24 should be 0.174 (122 strike outs, 698 plate appearances, 122/698 = 0.175 when rounded)
#25 should be 0.246 (176 hits, 714 plate appearances, 176/714 = 0.246 when rounded)