

Section 8.3: Discrete Random Variables

Friday, November 24, 2023 12:04 PM

a variable X is a random variable if the value it assumes in the outcome of an experiment is a chance or random event

examples of random events:

- result of a coin flip
note: coin does not have to be fair
- the sum of two dice when rolled
- the first card dealt in a card game

discrete random variable

- quantitative (it has a numerical value)
- can only take on certain values
- two 6-sided dice can have a sum of 3 or 4 but not π or 3.75

probability distribution:

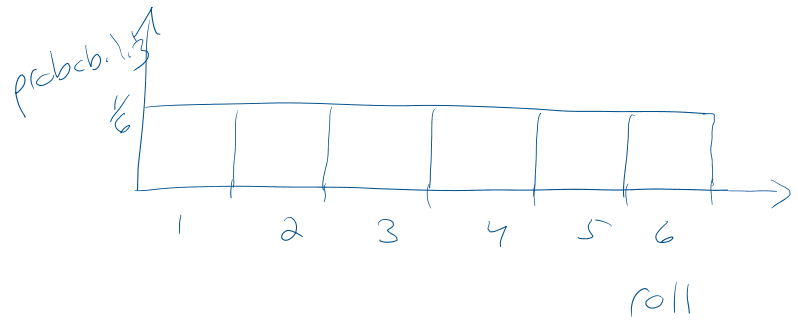
example: when you roll a fair 6-sided die, what is the probability of each roll?

table:

graph

roll	probability
1	$\frac{1}{6}$
2	$\frac{1}{6}$
3	$\frac{1}{6}$
4	$\frac{1}{6}$
5	$\frac{1}{6}$
6	$\frac{1}{6}$

sum = 1

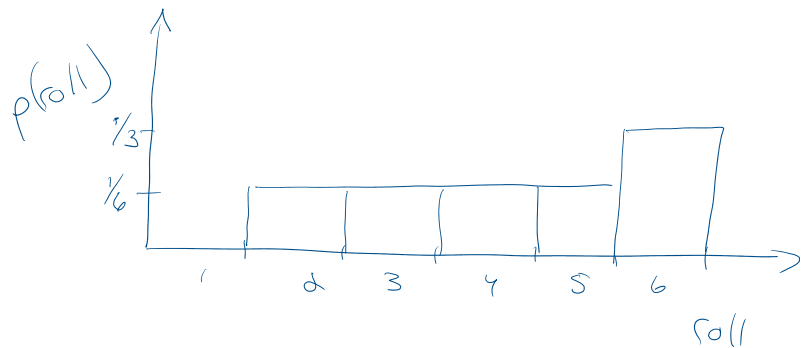


example: what is the probability of each outcome for rolling an unfair six-sided die if the probability of rolling a 2, 3, 4, or 5 is still $\frac{1}{6}$, but the probability of rolling a 1 is exactly zero?

table

roll	$p(\text{roll})$
1	0
2	$\frac{1}{6}$
3	$\frac{1}{6}$
4	$\frac{1}{6}$
5	$\frac{1}{6}$
6	$\frac{2}{6} = \frac{1}{3}$

sum = 1



probability distribution for a discrete random variable is a formula, table, or graph that gives the possible outcomes of x and their associated probabilities $p(x)$.

note: the sum of the probabilities must equal one

$$\sum p(x) = 1$$

example: complete the following probability distribution:

x	p(x)
0	$\frac{1}{10}$
1	$\frac{3}{5}$
2	$\frac{3}{10}$
	<hr/>
	sum = 1

← All in the missing value
 $= 1 - \frac{1}{10} - \frac{3}{10}$
 $= \frac{6}{10} = \frac{3}{5}$