

8.3 Discrete Random Variables

Random variable: Assigns a # to each outcome of an experiment.

e.g. $X = \#$ of heads that appear in 3 coin tosses.

Probability distribution: A table that lists the values of X and their probabilities.

e.g. $X = \#$ of heads that appear in 3 coin tosses

| X | $P(x)$ |
|-----|--------|
| 0 | 0.125 |
| 1 | 0.375 |
| 2 | 0.375 |
| 3 | 0.125 |

Ex: An unfair die has a $\frac{1}{9}$ chance of rolling a 1, a $\frac{2}{9}$ chance of rolling a 6, and a $\frac{1}{6}$ chance of rolling any other number.

Let $X =$ the number rolled. Find the probability distribution of X .

| X | $P(x)$ |
|-----|---------------|
| 1 | $\frac{1}{9}$ |
| 2 | $\frac{1}{6}$ |
| 3 | $\frac{1}{6}$ |
| 4 | $\frac{1}{6}$ |
| 5 | $\frac{1}{6}$ |
| 6 | $\frac{2}{9}$ |

FACT

In a probability distribution the probabilities sum to 1.

Ex: Is it a probability distribution?

| X | P(x) |
|---|------|
| 1 | 0.3 |
| 2 | 0.4 |
| 3 | 0.15 |
| 4 | 0.1 |

$$0.3 + 0.4 + 0.15 + 0.1 = 0.95$$

No

Ex: Find k so that it is a probability distribution.

| X | P(x) |
|---|------|
| 0 | 0.36 |
| 1 | k |
| 2 | 0.29 |

$$0.36 + k + 0.29 = 1$$

$$k = 0.35$$