ASSIGNMENT-6

AI1110

MUKUNDA REDDY
AI21BTECH11021

Outline

Example:6-4

Find the probaility mass distribution of two random variables for each of the following?

a. In the fair-die experiment random variable $x(f_i)$ equals the number of dots shown and y equals twice this number.

b. Toss the die twice and define random variables x and y such that x equals the first number that shows, and y shows second.

c. The die is tossed twice such that

$$x(f_i f_k) = |i - k|,\ y(f_i f_k) = i + k$$

.

Example:6-4 (a) Solution

Given $x(f_i) = i$ and $y(f_i) = 2i$ for $i = 1, 2, ...6$
in other words $x_i = i, y_k = 2i$ and

$$p_{ik} = P\{x = i, y = 2k\} = \begin{cases} \frac{1}{6} & i = k \\ 0 & i \neq k \end{cases}$$

Thus there are masses only on six points $(i, 2i)$ and mass of each point equals $\frac{1}{6}$.

Example:6-4 (a) Solution

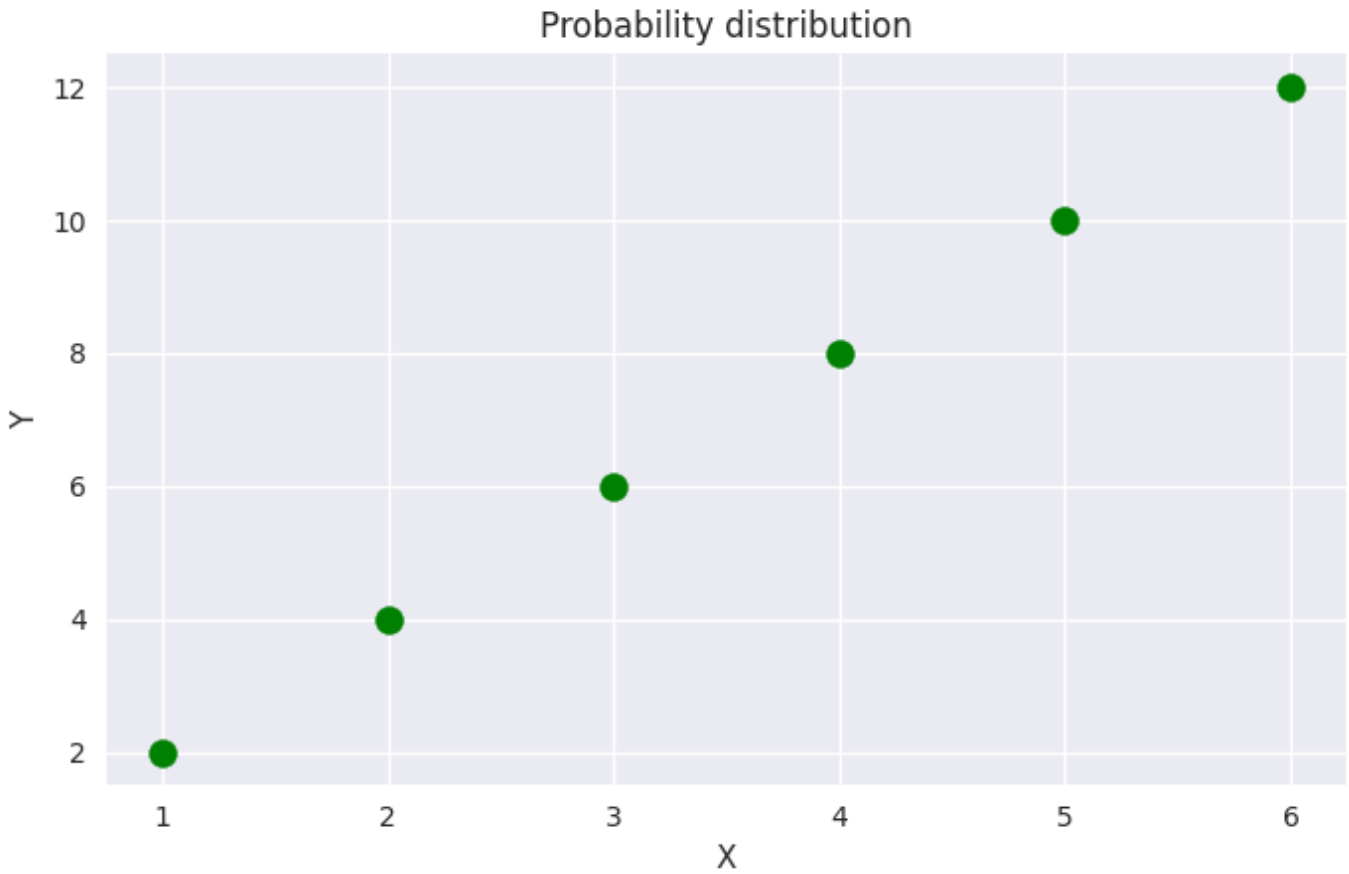

Figure: 6-4 (a)

Example:6-4 (b) Solution

We toss the dice twice so we get 36 outcomes $f_i f_k$.
Let random variables is defined as

$$x(f_i f_k) = i,\ y(f_i f_k) = k \quad \{i, k = 1, 2....6\}$$

Thus $x_i = i, y_k = k$, and $p_{ik} = \frac{1}{36}$.We therefore have 36 point masses and the mass of each point equals $\frac{1}{36}$.On the line $x = i$ there are 6 points with total mass $\frac{1}{6}$.

Example:6-4 (b) Solution

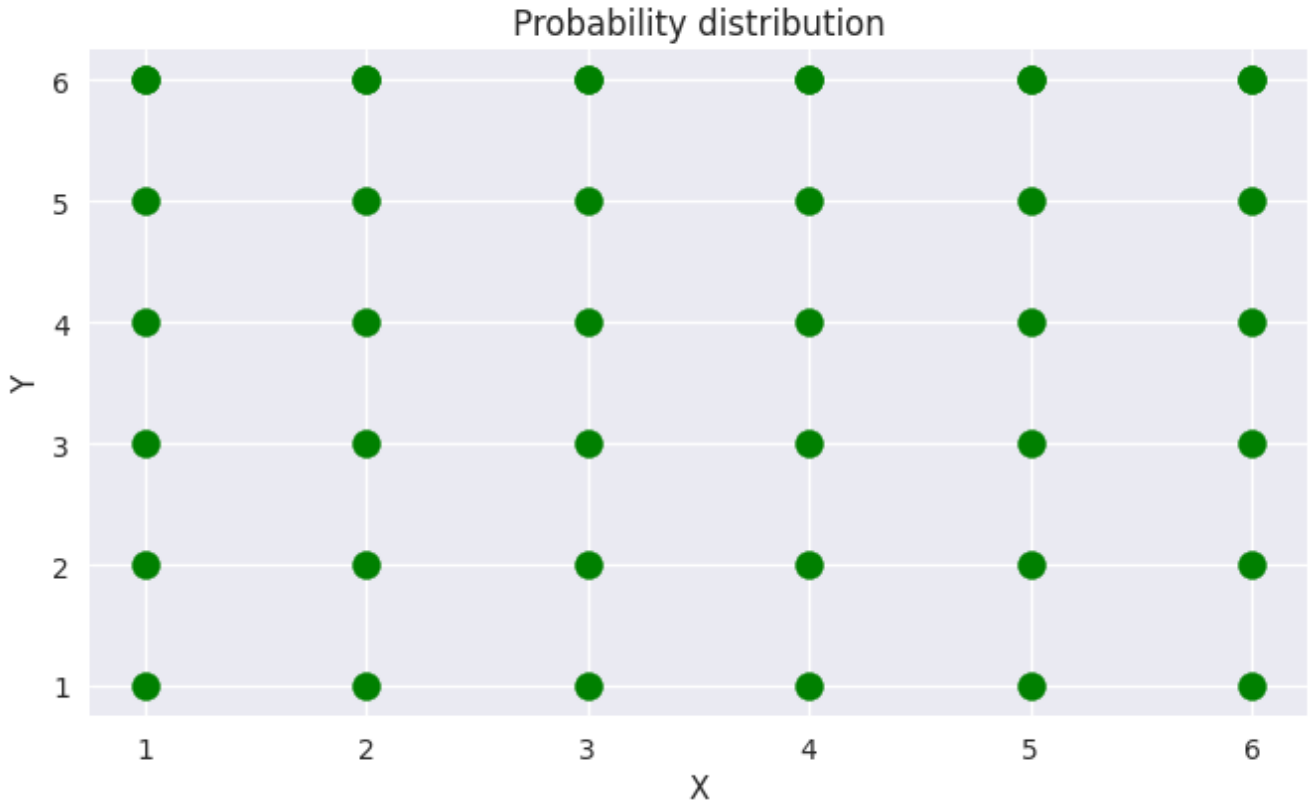

Figure: 6-4 (b)

Example:6-4 (c) Solution

We toss die twice In this case x takes $0, 1, 2, ...5$ and y takes the values $2, 3, ...12$.This gives $6 \times 11 = 66$ but only 21 positive mass points are found.

$$x(f_i f_k) = |i - k|,\ y(f_i f_k) = i + k$$

.

Consider the case $x = 0$ then $y = 2, 4, ..12$.if $x = 0$,then $i = k$ and $y = 2i$.There are 6 mass points in the line and mass of each point equals $\frac{1}{36}$.

Example:6-4 (c) Solution

If $x = 1$,then $y = 3, 5, ...11$.Thus,there are,five mass points on the line $x = 1$ and mass of each point equals $\frac{2}{36}$.
Consider $x = 1$ and $y = 7$ then there are two posibilities they are $i = 3, k = 4$ and $i = 4, k = 3$.

$$\text{Hence } P\{x = 1, y = 7\} = \frac{2}{36}$$

.
From the figure 3 all those that are circles has masses $\frac{2}{36}$ and triangles has masses $\frac{1}{36}$

Example:6-4 (c) Solution

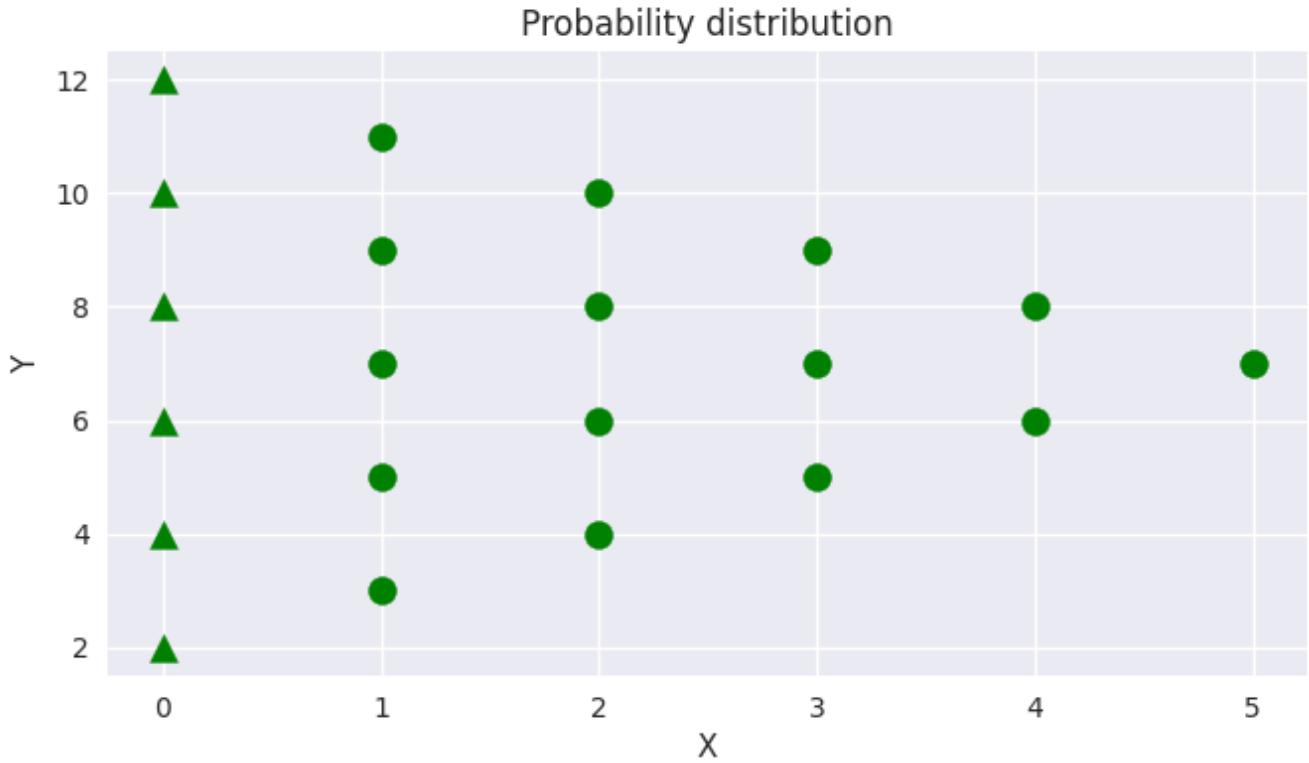

Figure: 6-4 (c)