A random variable is a function from the sample space to \( \mathbb{R} \).

Roll two dice:

\[
\begin{array}{cccc}
1 & 2 & 3 & 5 & 6 \\
2 & 3 & 4 & 5 & 6 \\
3 & 4 & 5 & 6 & 7 \\
5 & 6 & 7 & 8 & 9 \\
6 & 7 & 8 & 9 & 10 \\
\end{array}
\]

\( S = \{(i,j) \mid 1 \leq i \leq 6, 1 \leq j \leq 6\} \)

\( X((3,5)) = 3 + 5 = 8 \)

\( X((5,6)) = 5 + 6 = 11 \)

In general, \( X((i,j)) = i + j \)

Alternatively, we could have defined \( S = \{2, 3, ..., 12\} \)

If \( X \) denotes the sum of the two dice and \( w \) is the outcome,

\[ X(w) = w \quad \text{e.g.} \quad X(5) = 5 \quad X(11) = 11 \]

We can also define \( Y \) as the max of two die values:

\[ Y((i,j)) = \max(i, j) \]

\( Y((3,5)) = 5 \) \( Y((4,1)) = 4 \)

We could define \( Z \) as the value of the red die

\( Z((i,j)) = i \)

Could define, e.g.,

\[ V((i,j)) = \frac{i+j}{2} \]

\[ V((4,1)) = \frac{4+1}{2} = \frac{5}{2} = 2.5 \]

\[ V((3,5)) = \frac{3+5}{2} = 4 \]