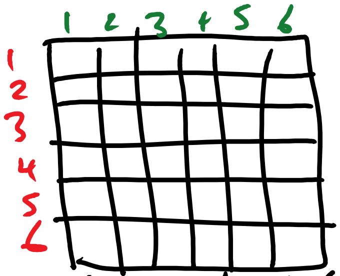
A <u>random variable</u> is a function from the sample space to $\mathbb{R}$.

Roll two dice




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

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

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

in general $\quad X((i,j)) = i+j$

We can also define $Y$ as the max of two die values

$Y((i,j)) = \max(i,j)$

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

We could define $Z$ as the value of the red die

$Z((i,j)) = i$

Could define, e.g., $V((i,j)) = \dfrac{i+j}{2}$

$V((4,1)) = \dfrac{4+1}{2} = \dfrac{5}{2} = 2.5$

$V((3,5)) = \dfrac{3+5}{2} = 4$

Alternatively, we could have defined

$S = \{2, 3, \ldots, 12\}$

If $X$ denotes the sum of the two dice and $\omega$ is the outcome,

$X(\omega) = \omega \qquad$ e.g. $X(5) = 5$

$X(11) = 11$