If we only want to know whether the number rolled is even or odd, we could just choose the sample space

$$S_2 = \{\text{even}, \text{odd}\}.$$

<u>Ex.</u> Roll two dice, one red and one green.

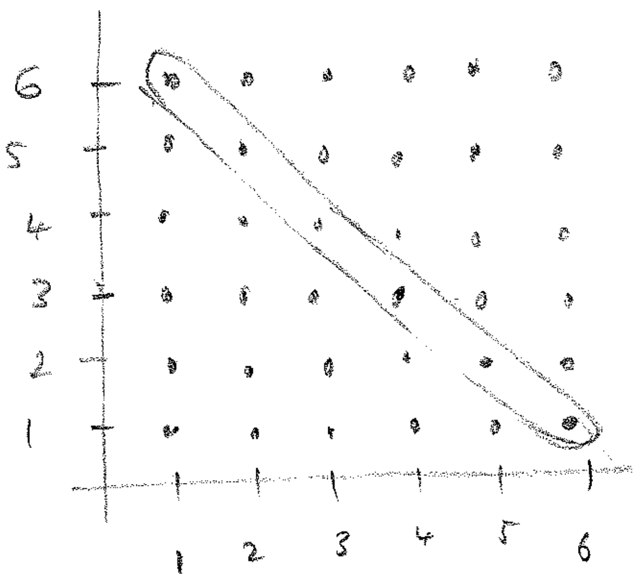
Sample space with the most information consists of the 36 points given by

$$S_1 = \{(x,y) \mid x = 1,2,\ldots,6\ ;\ y = 1,2,\ldots 6\}$$

If we're only interested in the total of the two dice, we could instead use

$$S_2 = \{2,3,4,\ldots\ldots,12\}.$$

The event '1 roll a 7' is just the sample point 7 in S_2. In S_1 it is given by $\{(1,6), (2,5), (3,4), (4,3), (5,2), (6,1)\}$.



Events (rather than sample points) are particularly important when measuring quantities which vary continuously where the sample space contains an interval.

eg. Measure the height of a child in metres. Very unlikely that the child will be exactly 1m tall but there is a fair chance the child will be between 1m and 1.1m.

Ex. Construct a sample space for the life of a certain electronic component and indicate the subset which represents the event F that the component fails before the end of the 6th year.

Let t be the length of the component's useful life in years.

Then

$$S = \{ t \mid t \geq 0 \} = [0, \infty)$$

and

$$F = \{ t \mid 0 \leq t < 6 \} = [0, 6).$$

Events are subsets of the sample space.

If the sample space is discrete, the converse is true and all subsets of the sample space are events.

However, it is not true in general that an arbitray subset of an arbitrary sample space will be an event. The reasons behind this are technical (measure theory).

Events can be combined using the usual operations of unions, intersections, and complements of sets (provided we only do countably many operations).