- Have machines A_1, A_2, A_3 producing products with $2\%, 1\%, 3\%$ defectives respectively. Given that A_1, A_2, A_3 supply $35\%, 25\%, 40\%$ respectively of the total output,

$$p(\text{defective selected came from } A_3) = p(A_3 \mid \text{defective})$$
$$= \frac{p(\text{defective} \mid A_3)\, p(A_3)}{p(\text{defective})} = \frac{\frac{3}{100}\cdot\frac{40}{100}}{\frac{215}{10000}} = \frac{120}{215}.$$

Definitions

The set of all possible outcomes is the <u>samplespace</u>. Sometimes we use "sample space" to denote (by abuse of notation) the set of events <u>caused</u> by the possible outcomes.

A <u>random variable</u> is a function defined on a sample space.

Examples

- Roll a pair of dice.
  The set $S = \{(1,1), (1,2), \dots, (6,6)\}$ of all 36 pairs of numbers is the sample space, and a <u>multivariate</u> random variable X could be defined on S by
  $$X(a,b) := (a,b).$$
  Given the same S, we could define a <u>single-variate</u> random variable Y on S by
  $$Y(a,b) := a+b.$$
  We might even choose to call $S' = \{2, 3, \dots, 12\}$ of all 11 values of Y a sample space (by common abuse of notation).
- Consider a bucket of n things, where n_1 are red and $n_2 = n - n_1$ are white.
  Event: select (without replacement) r things.
  Here $S = \{(r,0), (r-1,1), \dots, (0,r)\}$ where (a,b) means that a selected things are red and b are white.