1. Problem

An industry-leading company seeks a qualified candidate for a management position. A management consultancy carries out an assessment center which concludes in making a positive or negative recommendation for each candidate: From previous assessments they know that of those candidates that are actually eligible for the position (event E) 66% get a positive recommendation (event R). However, out of those candidates that are not eligible 65% get a negative recommendation. Overall, they know that only 9% of all job applicants are actually eligible.

What is the corresponding fourfold table of the joint probabilities? (Specify all entries in percent.)

	R	\overline{R}	sum
E	%	%	%
\overline{E}	%	%	%
sum	%	%	%

Solution

Using the information from the text, we can directly calculate the following joint probabilities:

$$\begin{array}{rcl} P(E \cap R) &=& P(R|E) \cdot P(E) = 0.66 \cdot 0.09 = 0.0594 = 5.94\% \\ P(\overline{E} \cap \overline{R}) &=& P(\overline{R}|\overline{E}) \cdot P(\overline{E}) = 0.65 \cdot 0.91 = 0.5915 = 59.15\%. \end{array}$$

The remaining probabilities can then be found by calculating sums and differences in the fourfold table:

	R	\overline{R}	sum
E	5.94	3.06	9.00
\overline{E}	31.85	59.15	91.00
sum	37.79	62.21	100.00

(a) $P(E \cap R) = 5.94\%$

- (b) $P(\overline{E} \cap R) = 31.85\%$
- (c) $P(E \cap \overline{R}) = 3.06\%$
- (d) $P(\overline{E} \cap \overline{R}) = 59.15\%$
- (e) P(R) = 37.79%
- (f) $P(\overline{R}) = 62.21\%$
- (g) P(E) = 9.00%
- (h) $P(\overline{E}) = 91.00\%$
- (i) $P(\Omega) = 100.00\%$