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:

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

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) $P(\Omega) = 100.00\%$