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) 74% get a positive recommendation (event R). However, out of those candidates that are not eligible 73% get a negative recommendation. Overall, they know that only 13% 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:

$$P(E \cap R) = P(R|E) \cdot P(E) = 0.74 \cdot 0.13 = 0.0962 = 9.62\%$$
$$P(\overline{E} \cap \overline{R}) = P(\overline{R}|\overline{E}) \cdot P(\overline{E}) = 0.73 \cdot 0.87 = 0.6351 = 63.51\%.$$

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

	R	$\overline{R}$	sum
E	**9.62**	*3.38*	**13.00**
$\overline{E}$	*23.49*	**63.51**	*87.00*
sum	*33.11*	*66.89*	**100.00**

(a) $P(E \cap R) = 9.62\%$
(b) $P(\overline{E} \cap R) = 23.49\%$
(c) $P(E \cap \overline{R}) = 3.38\%$
(d) $P(\overline{E} \cap \overline{R}) = 63.51\%$
(e) $P(R) = 33.11\%$
(f) $P(\overline{R}) = 66.89\%$
(g) $P(E) = 13.00\%$
(h) $P(\overline{E}) = 87.00\%$
(i) $P(\Omega) = 100.00\%$