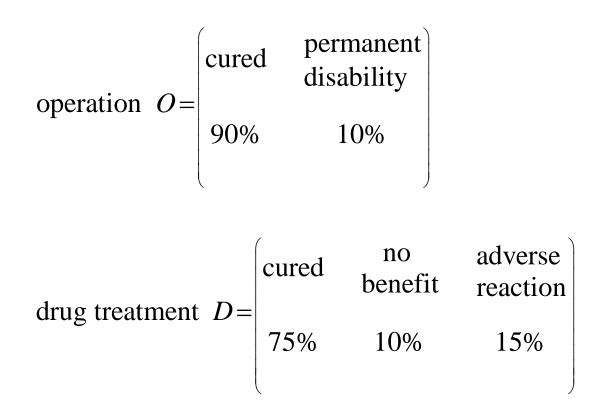
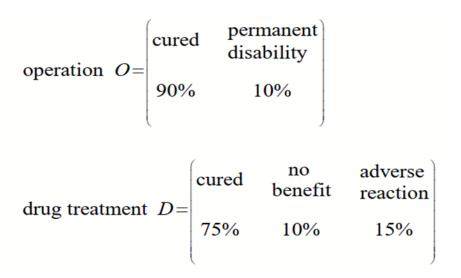
Theorem 2. Let \succeq be a von Neumann-Morgenstern ranking of the set of basic lotteries \mathcal{L} . Then the following are true.

- (A) If $U: Z \to \mathbb{R}$ is a von Neumann-Morgenstern utility function that represents \succeq , then, for any two real numbers *a* and *b* with a > 0, the function $V: Z \to \mathbb{R}$ defined by $V(z_i) = aU(z_i) + b$ (i = 1, 2, ..., m) is also a von Neumann-Morgenstern utility function that represents \succeq .
- (B) If $U: Z \to \mathbb{R}$ and $V: Z \to \mathbb{R}$ are two von Neumann-Morgenstern utility functions that represent \succeq , then there exist two real numbers *a* and *b* with a > 0 such that $V(z_i) = aU(z_i) + b$ (i = 1, 2, ..., m).

$$U = \begin{cases} z_1 & z_2 & z_3 & z_4 & z_5 & z_6 \\ 10 & 6 & 16 & 8 & 6 & 14 \end{cases}$$



What should you do?



The Allais paradox

(Maurice Allais, 1952)

 $A = \begin{pmatrix} \$1M \\ 100\% \end{pmatrix} \quad \text{versus} \quad B = \begin{pmatrix} \$2.5M & \$1M & 0 \\ 10\% & \$9\% & 1\% \end{pmatrix}$

$$C = \begin{pmatrix} \$1M & 0\\ 11\% & 89\% \end{pmatrix} \quad \text{versus} \quad D = \begin{pmatrix} \$2.5M & 0\\ 10\% & 90\% \end{pmatrix}.$$

