## MinMax REGRET



Define the **regret of taking action** *a* **under state** *s* as the difference between the maximum utility you could have got under state *s* (by taking the best action for that state) and the utility that you get with action *a*. We can then construct a **regret table**:

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If I had chosen an alternative utility function, would I have reached the same conclusion in terms of MinMaxRegret? Consider a new decision problem:







Suppose that the values of *p* and *q* are not available

Surgery would be successful 1 Drug would be successful 1 not 

U **2**<sub>1</sub> 100 **2**<sub>3</sub> 75

## Example from the first class How to process information

- In the US, 1% of women of age 40 have breast cancer.
- If a woman has breast cancer, the probability that she tests **positive** on a screening mammogram is **90%**.
- If she does not have breast cancer, the probability that she tests negative on a screening mammogram is 90%.
  That is, mammograms have a 90% accuracy.

Susan is a 40-year old woman who tested **positive** on a mammogram.

What are the chances that she actually has breast cancer?



## **CONDITIONAL REASONING: the FREQUENCY approach**

- Suppose there is a new variant of COVID
- The fraction p of the population is infected
- Typical symptoms: nasal congestion
- 80% of those infected have the symptoms
- 10% of those **not** infected have the symptoms

Suppose that p = 5%. You wake up with nasal congestion. How likely is it that you are infected?

- 5% of the population are infected
- 80% of those infected have the symptoms
- 10% of those **not** infected have the symptoms

