Section 4.4: cont'd

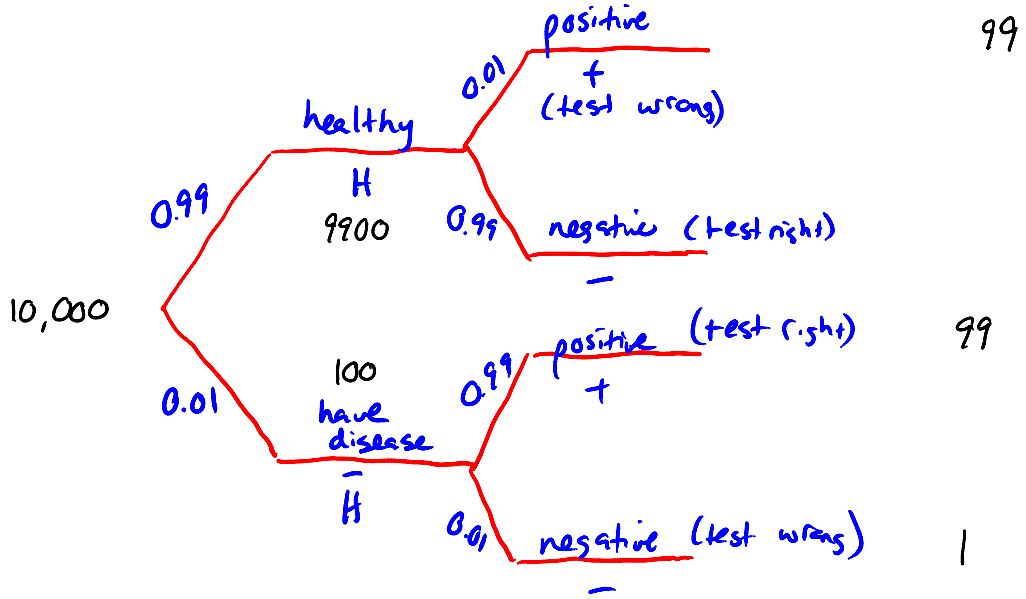
Tuesday, May 14, 2013
11:31 AM

example: The test for a rare disease has 99% reliability. Only one percent of the population has this rare disease.

If the entire population is tested, then some who are healthy will have the test be positive for the disease. (false positive). Some who have the disease but will test negative (false negative).

→ If an individual test positive, what is the probability that they actually have this rare disease?

(hint: if you prefer, consider the population to be 10 000 individuals and determine how many individuals fall into each group)



$$P(\bar{H} \mid +) = \frac{n(\bar{H}+)}{n(+)} = \frac{99}{2(99)} = \frac{1}{2}$$

if

---

theory (can omit)

- if given $P(A)$ and $P(B|A)$ and $P(B|\bar{A})$, what is $P(A|B)$?

$$P(A|B) = \frac{P(AB)}{P(B)}$$

$$= \frac{P(B|A)\,P(A)}{P(B|A)\,P(A) + P(B|\bar{A})\,P(\bar{A})}$$

and in general:

$$P(A_i|B) = \frac{P(B|A_i)\,P(A_i)}{\sum P(B|A_i)\,P(A_i)}$$