

Module 1

Section 1.

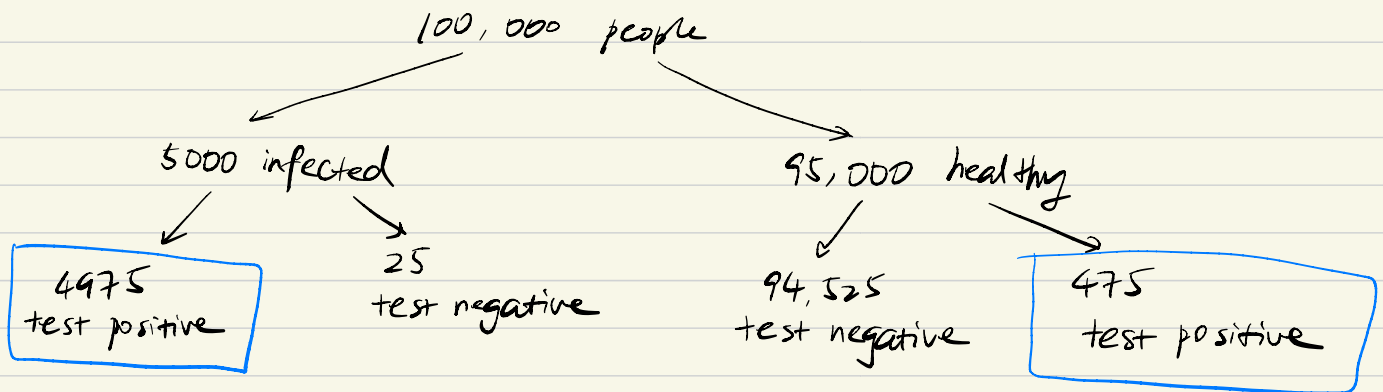
$$\text{Task 1: } \begin{cases} \text{sensitivity} = \frac{\text{predicted True Positive}}{\text{True Positive}} = 99.5\% \\ \text{specificity} = \frac{\text{predicted True Negative}}{\text{True Negative}} = 99.5\% \end{cases}$$

5% population is infected.

$$\begin{aligned} P(\text{positive} | \text{Tested Positive}) &= \frac{P(\text{tested Positive} | \text{Positive}) \cdot P(\text{Positive})}{P(\text{tested Positive})} \\ &= \frac{(\text{sensitivity}) \cdot (\text{population infected})}{P(\text{test pos} | \text{pos}) P(\text{pos}) + P(\text{test pos} | \text{neg}) P(\text{neg})} \\ &= \frac{99.5\% \times 5\%}{99.5\% \times 5\% + 0.5\% \times 95\%} \\ &= \frac{4.975\%}{4.975\% + 0.475\%} = 91.28\% \end{aligned}$$

Task 2: Integer Confirmation

assume there are 100,000 people in a city,
thus 5000 are infected, 95,000 are healthy.



$$\begin{aligned} \Rightarrow \text{Fred is indeed positive} &= \frac{\text{positive \& tested positive}}{\text{tested positive}} \\ &= \frac{4975}{4975 + 475} = \underline{\underline{91.28\%}} \end{aligned}$$

Task 4: assume human have total of 20,000 genes, and we have total of 2544 GWAS reported genes and 2104 drug targets, with 23 being overlapping. Thus, we have total of $2544 + 2104 - 23 = 4625$ target genes.
 $\rightarrow 4625 / 20,000 = 23.125\%$

Task 5: around 0.6% of GWAS reported genes are overlapping with drug targets