Question 1

There are two ways a sequence of flips can start that do not create a $H \to T$ combo.

Way_1 = T followed by (sequence with no $H \to T$)

Way_2 = $H \to H$ followed by (sequence with no $H \to T$)

This recurrance relation is the Fibonacci sequence.

For Way_1, the Outcome Space is $\{H, T\}$, neither of which is $H \to T$, So in our sequence $F_1 = 2$.

For Way_2, the Outcome Space is $\{HH, HT, TH, TT\}$, three of which aren't $H \to T$, So in our sequence $F_2 = 3$

Therefore, the number of ways to avoid $H \to T$ in n flips is Fib_n shifted by two terms, or Fib_{n+2}. The number of total possible outcomes in n flips is 2^n. So $\boxed{P(\text{no H then T}) \text{ in } n \text{ flips} = Fib_{n+2}/2^n}$

Question 2

$P(\text{disease}) = 0.01$ $\quad P(\text{positive} \mid \text{disease}) = 0.95$

$P(\neg\text{disease}) = 0.99$ $\quad P(\text{positive} \mid \neg\text{disease}) = 0.02$

$$P(\text{disease} \mid \text{positive}) = \frac{P(\text{positive} \mid \text{disease}) P(\text{disease})}{P(\text{positive} \mid \text{disease}) P(\text{disease}) + P(\text{positive} \mid \neg\text{disease}) P(\neg\text{disease})}$$

$$= \frac{0.95 \cdot 0.01}{0.95 \cdot 0.01 + 0.02 \cdot 0.99} = \boxed{0.324232}$$