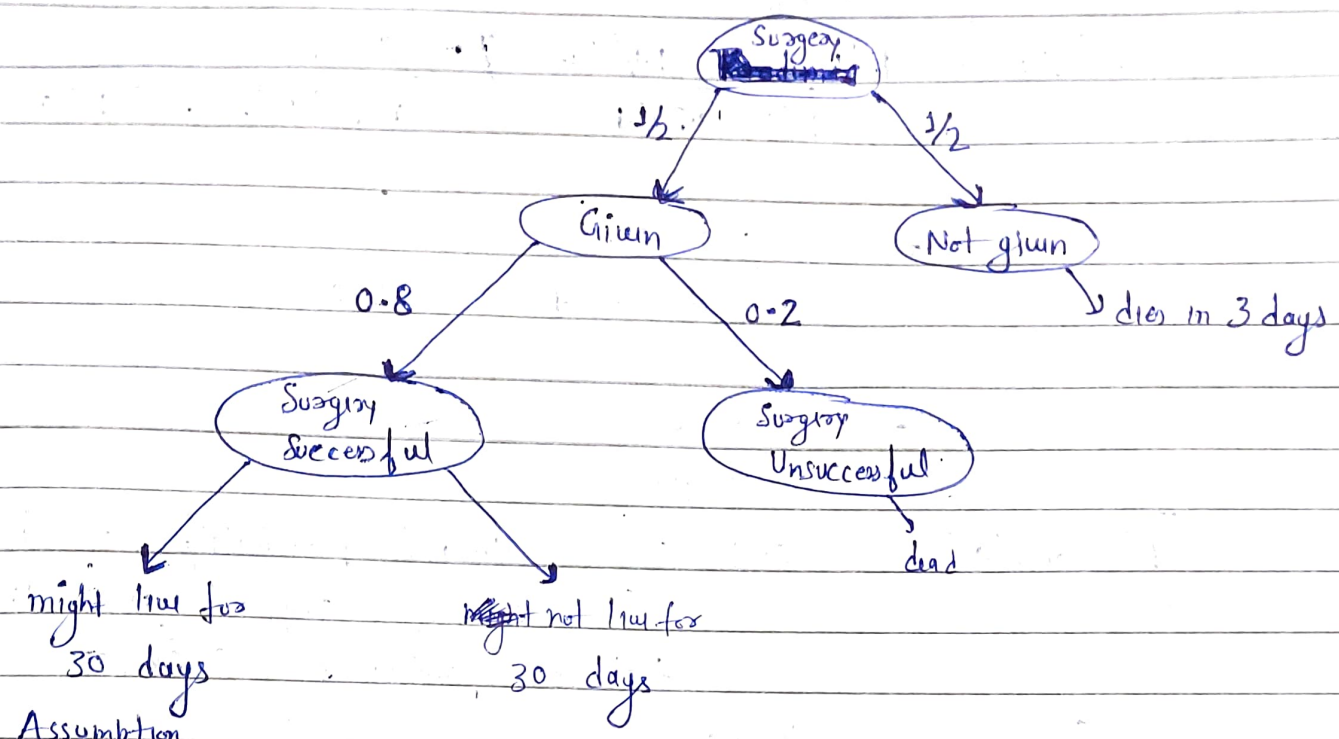
Assignment -2

Section A

a)



Assumption

- Probabilty of wheather surgery is given or not is 0.5.
- Probility of surgery to be sucessful = 0.8
- Probility of Surger to be unsuccessful = 0.2
- There is risk associated with the surgery.
- When the surgery is unssucessful, the person is dead.

c)

True-positive rate = $P(+/\text{survive}) = 0.95$

False-negative rate = $P(+/\text{not survive}) = 0.05$

→ Using Bayes theorem

$$P(\text{survive}/+) = \frac{P(+/\text{survive}) \times P(\text{survive})}{P(\text{survive}) \times P(+/\text{survive}) + P(+/\text{not survive}) P(\text{not survive})}$$

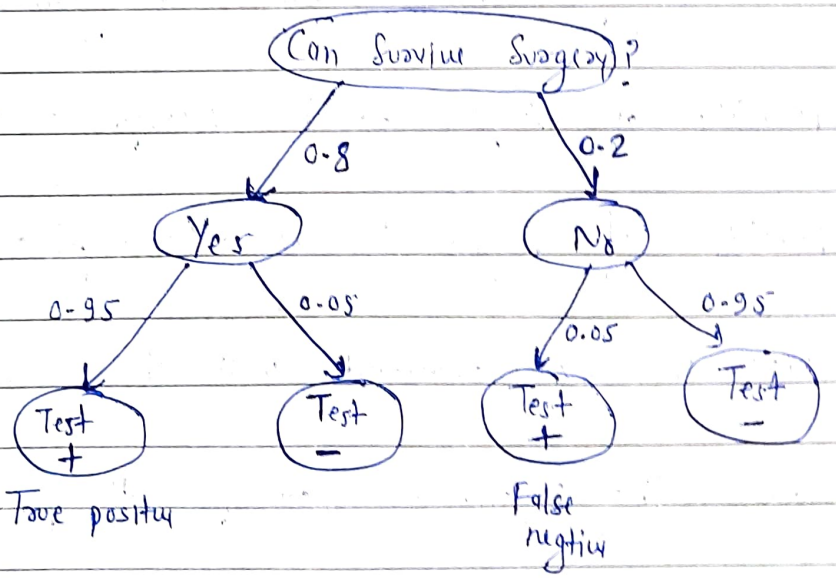
$$= \frac{0.95 \times 0.8}{0.95 \times 0.8 + 0.2 \times 0.05}$$

$$= \frac{0.78}{0.77}$$

$$\boxed{P(\text{survive}/+) = 0.9870}$$

. Hence, probability of having a successful surgery given the test is positive is 0.98707

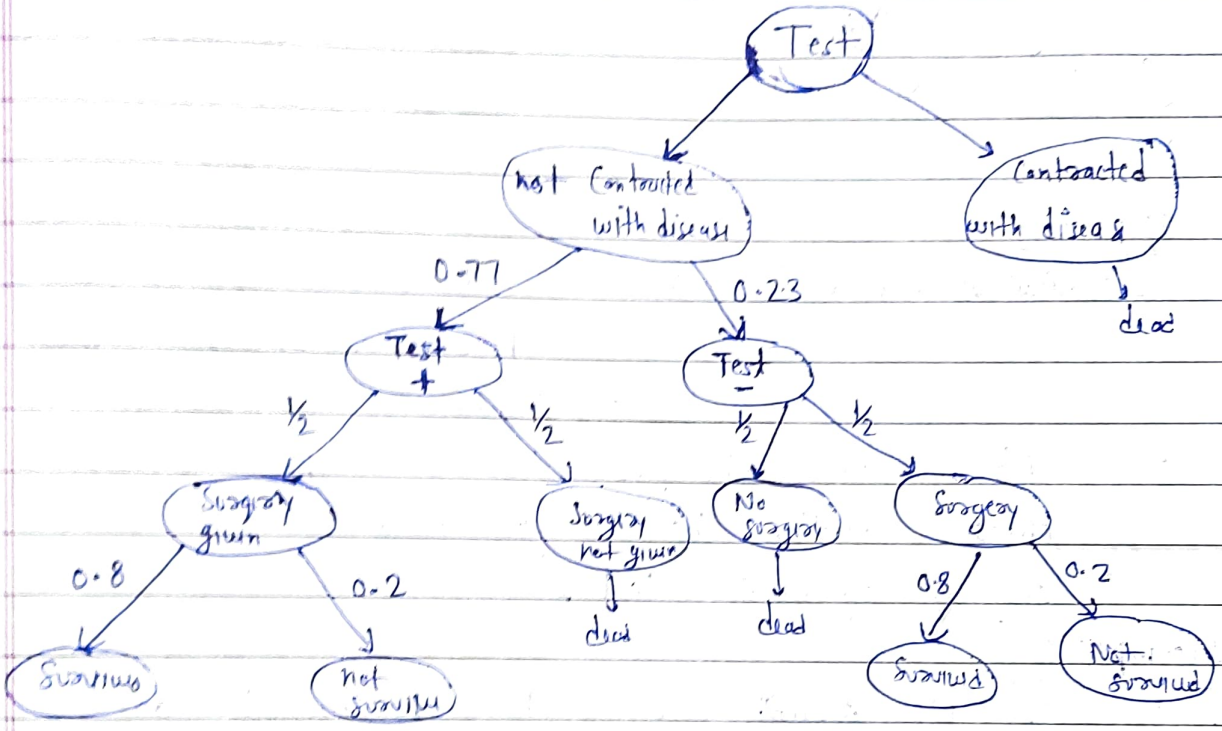
→ Tree of this problem



d) Yes, Surgery should be preferred if the result of the test is positive because $P(\text{survive}/+) = 0.987$

Probability of having a successful surgery if the test is positive is coming out to be 0.987 means there is 98.7% chance that he will survive the surgery. This is much high, Therefore the test is reliable.

e)



$P(+) = 0.77$ Calculated in Part c)

$P(-) = 0.23$ Calculated in Part c)

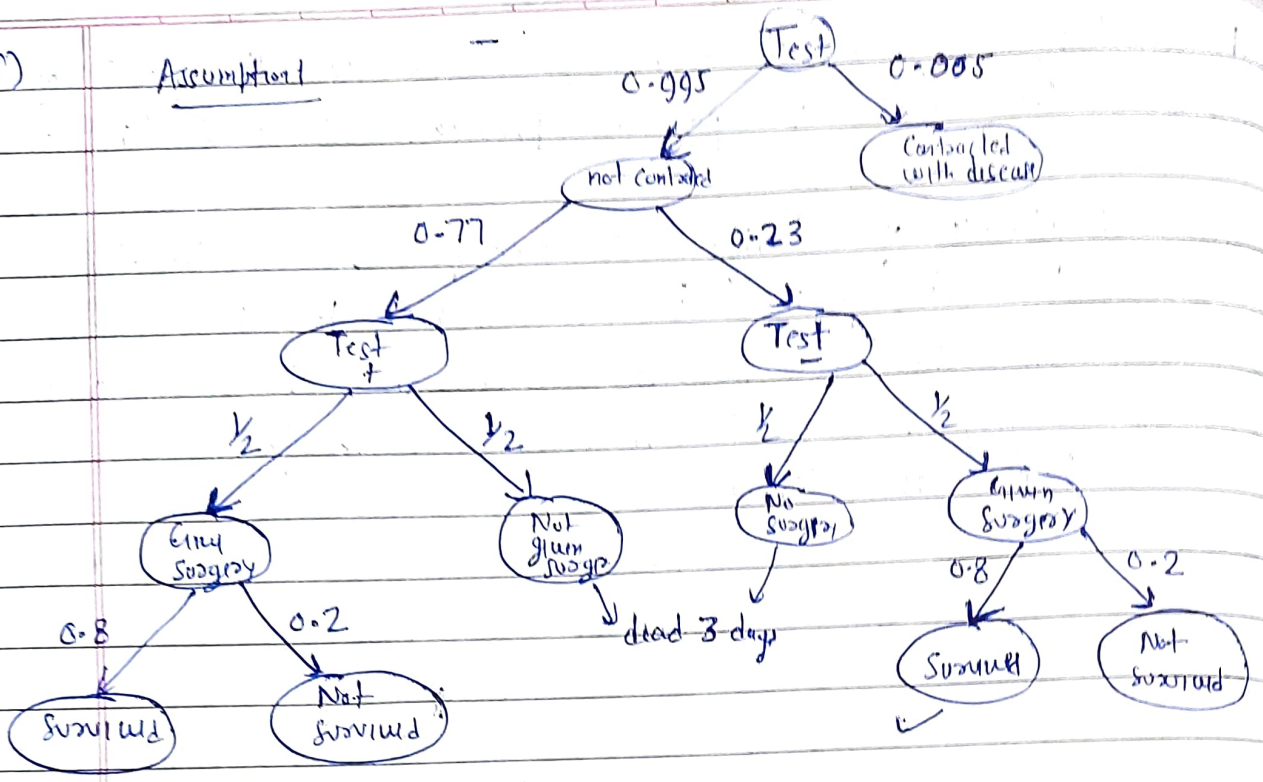
$P(+) = 0.95 \times 0.8 + 0.2 \times 0.005$

$= 0.77$

$P(-) = 1 - 0.77 = 0.23$

- We assume that when the test is (+) Person has the option to choose whether he/she wants to proceed with the surgery or not. ($P = 1/2$)

f) Assumption 1



Assumption 1

P(survival when test is done prior) = 0.995 × 0.77 × 0.5 × 0.8
+ 0.995 × 0.23 × 0.5 × 0.8
= 0.386

- This is when the person has the option to choose whether he will go ahead with the surgery after the test.

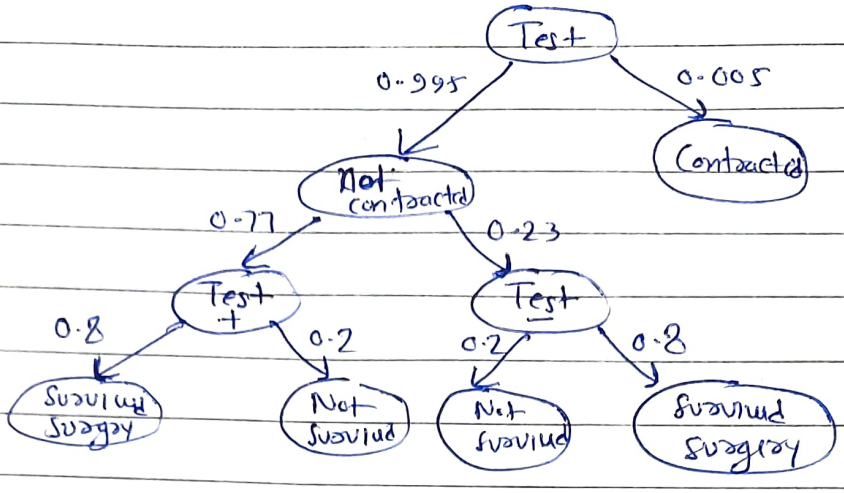
Assumption 2

- If we assume that he has to accept surgery after the test then the

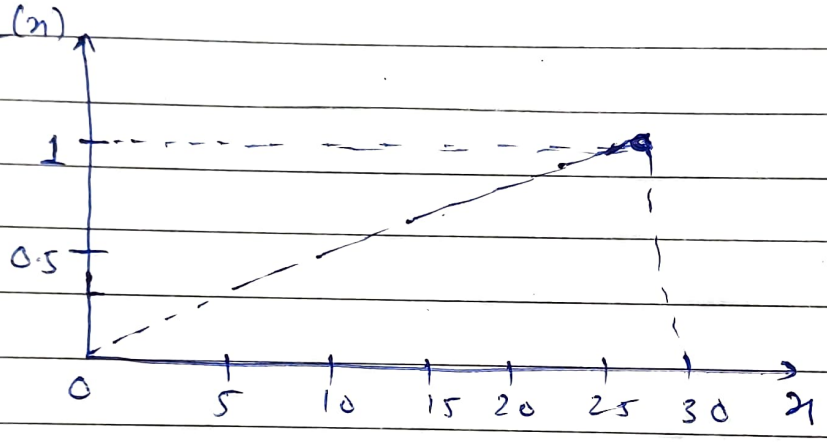
P(surviving when test is done prior) = 0.995 × 0.77 × 0.8
+ 0.995 × 0.23 × 0.8
= 0.796

- Bobby of survive is 0.786 after the test test should be done prior to surgery/operation

Tree for assumption 2



b) $y = L(x)$



Given $L(0) = 0$ Assuming $L(x)$ is Linear

$L(30) = 1$

eq of function:- slope $= \frac{1-0}{30-0} = \frac{1}{30}$

$y = mx$

$$\boxed{y = \frac{1}{30}(x)}$$

when $x = 3$

$$L(x) = \frac{1}{30}(3) = \frac{1}{10} = 0.1$$