p. 451 - 452 #79-84

(79) $P(\overset{B}{\text{prosperous}} \mid \overset{A}{\text{educated}}) = \dfrac{P(\text{pros} \cap \text{educated})}{P(\text{educated})} = \dfrac{.082}{.261} = .3142$

31.42%

$P(B \mid A) \overset{?}{=} P(B)$

$.3142 \overset{?}{=} .261$ Not independent

(80) A = gross income ≥ \$100,000 $P(gi \geq 100{,}000) = \dfrac{10855000}{129075000} = .0841$

B = gross income ≥ \$1,000,000 $P(gi \geq 1{,}000{,}000) = \dfrac{240{,}000}{129075000} = .0019$

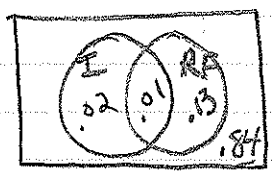
→ Note: If gi is over \$1,000,000, it is ALSO over \$100,000.

$P(B \mid A) = \dfrac{.0019}{.0841} = 0.0226$

(81) P(Infection) = .03 P(Repair Fails) = .14

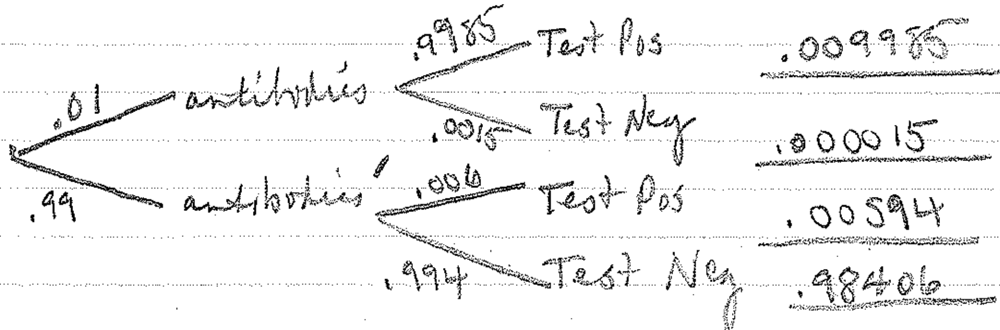
P(Infection') = .97 P(Repair Succeeds) = .86

P(Repair Succeeds ∩ Inf') = .84



** Can't Multiply!! Events are not independent!! (Think Real Life!!)

(82) a)

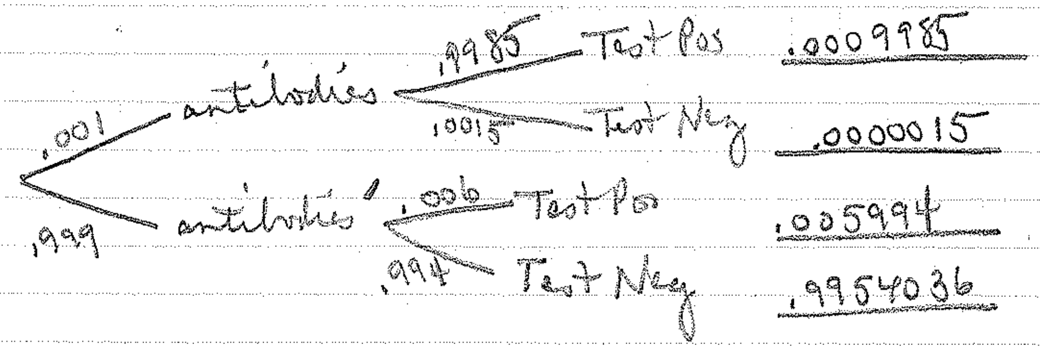


b) P(Test Pos) = .009985 + .00594 = **.015925**

c) $P(\text{antibodies present} \mid \text{Test Pos}) = \dfrac{P(\text{antibodies} \cap \text{Test Pos})}{P(\text{Test Pos})}$

$$= \frac{.0099985}{.0159925} = .627 \quad \boxed{62.7\%}$$

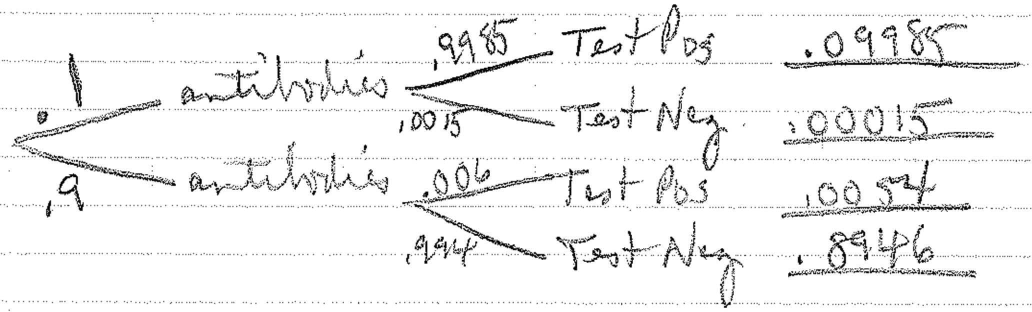
(83) a)



$P(\text{antibodies} \mid \text{Test Pos}) = \dfrac{P(\text{antibodies} \cap \text{Test Pos})}{P(\text{Test Pos})}$

$$= \frac{.0009985}{.0009985 + .005994} = \frac{.0009985}{.0069925} = .1428 \quad \boxed{14.28\%}$$

b)



$P(\text{antibodies} \mid \text{Test Pos}) = \dfrac{P(\text{antibodies} \cap \text{Test Pos})}{P(\text{Test Pos})}$

$$= \frac{.09985}{.09985 + .0054} = \frac{.09985}{.10525} = .9487 \quad \boxed{94.87\%}$$

c) Test probabilities can be affected by the how common the factor tested occurs in the general population.

(84) A = student at UNH is female $P(A) = .6$

B = student studies education $P(B) = .15$

$P(A|B) = .8 \qquad P(A|B) = \dfrac{P(A \cap B)}{P(B)}$

$$.8 = \frac{P(A \cap B)}{.15}$$

$$(.8)(.15) = P(A \cap B)$$

$$.12 = P(A \cap B) = P(B \cap A)$$

$$P(B|A) = \frac{P(B \cap A)}{P(A)} = \frac{.12}{.6} = .2 \quad \boxed{20\%}$$