

# Bayes' Theorem <sup>4.6 · 4.7</sup>

3

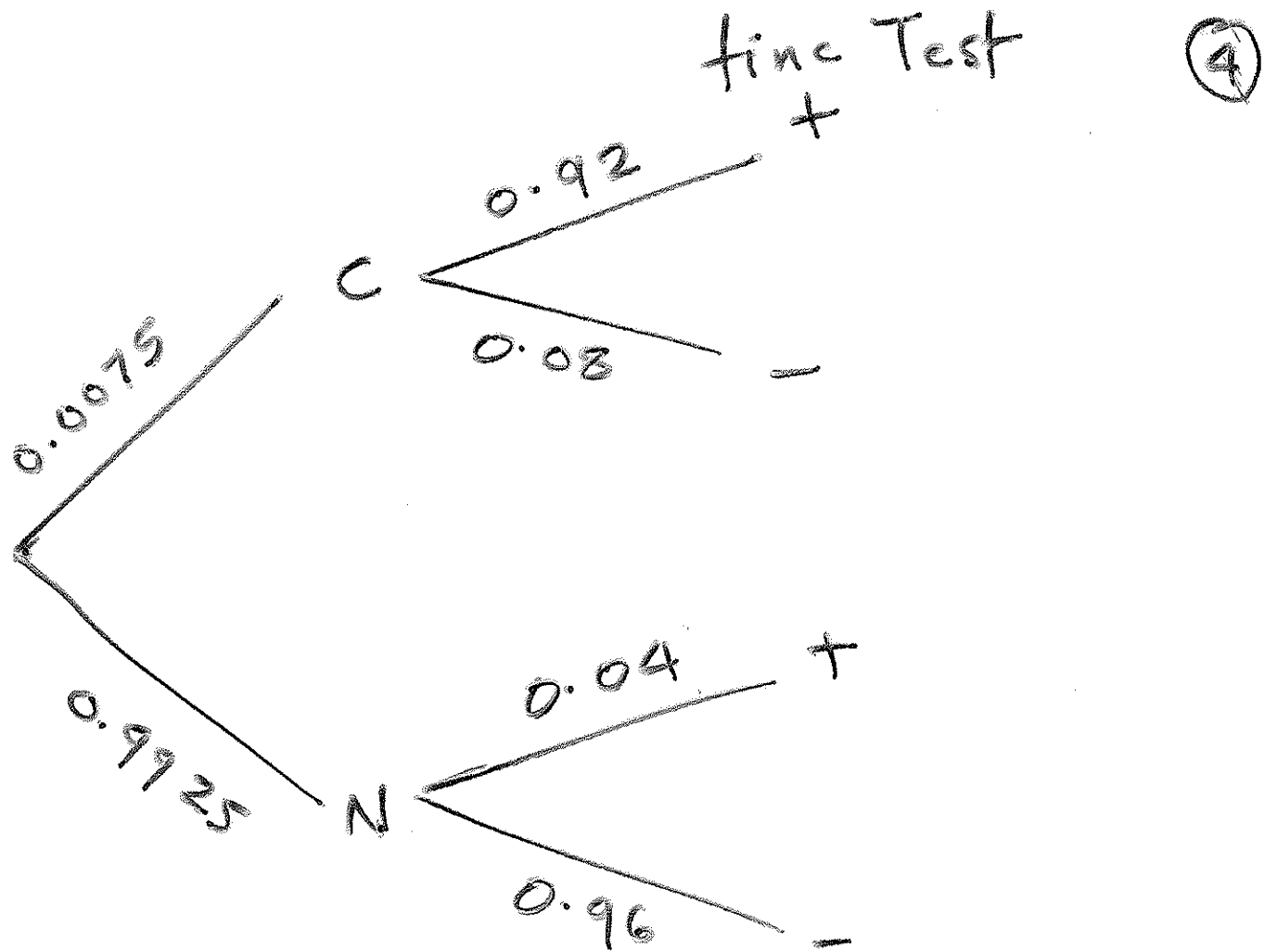
Let  $E_1, E_2, \dots, E_m$  be mutually Exclusive events in a sample space  $S$  with  $E_1 \cup E_2 \cup \dots \cup E_n = S$

If  $F$  is any event in  $S$ , then for  $i = 1, 2, \dots, n$ ,

$$P(E_i | F) = \frac{\text{Probability of branch } E_i \cap F}{\text{Sum of all prob of all branch that end in } F}$$

$$= \frac{P(E_i) P(F | E_i)}{P(E_1) P(F | E_1) + P(E_2) P(F | E_2) + \dots}$$

X Refer to page 240 in the book for the formula.



$$P(C|+) = \frac{P(C \cap +)}{P(+)}$$

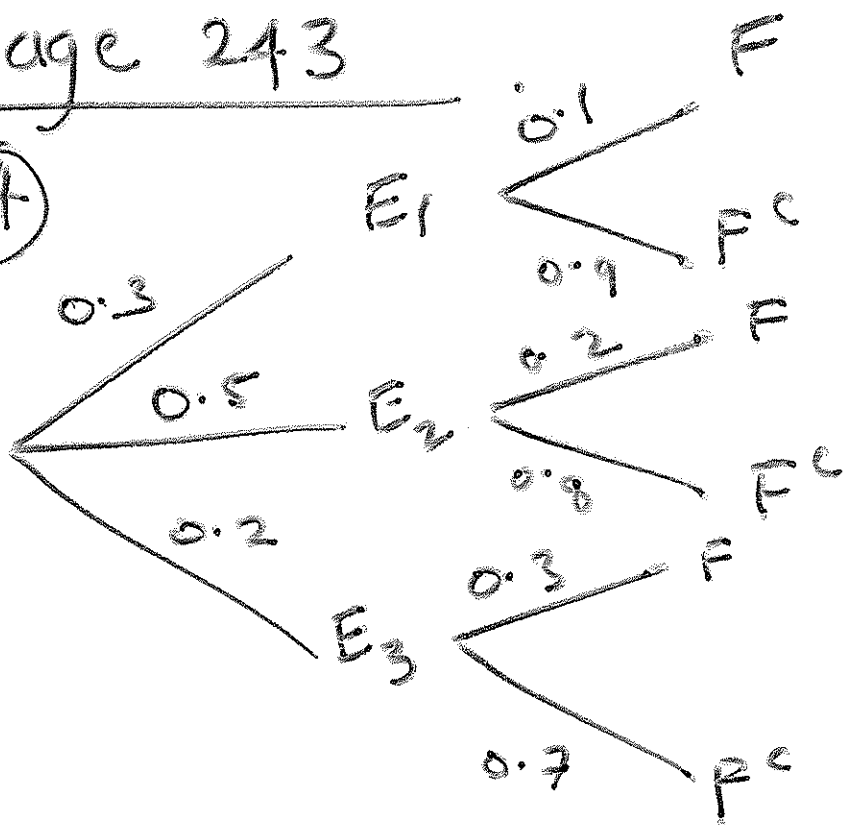
$$= \frac{P(C) \cdot P(+|C)}{P(C) \cdot P(+|C) + P(N) \cdot P(+|N)}$$

$$= \frac{(0.0075)(0.92)}{(0.0075)(0.92) + (0.9925)(0.04)}$$

$$= 0.15$$

④

⑤

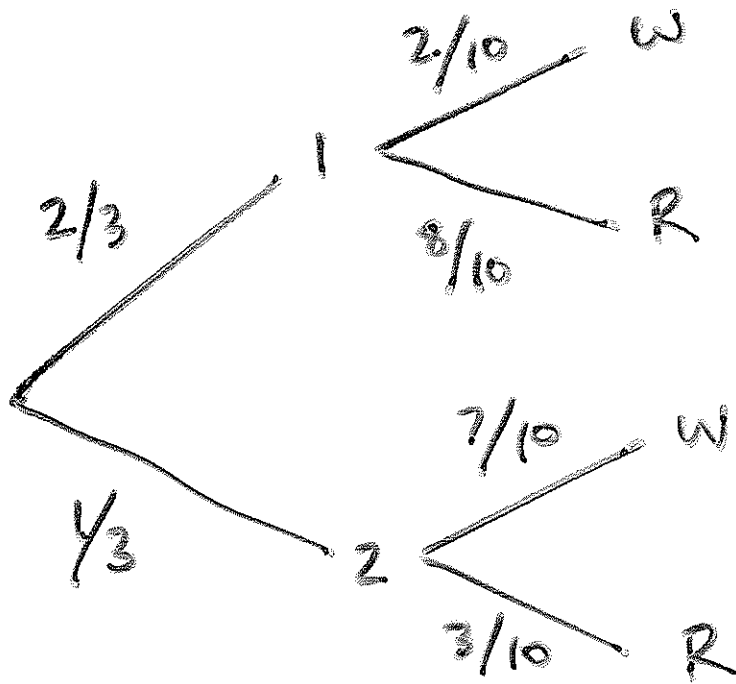


$$P(E_3|F) = \frac{P(E_3) \cdot P(F|E_3)}{P(E_1) \cdot P(F|E_1) + P(E_2) \cdot P(F|E_2) + P(E_3) \cdot P(F|E_3)}$$

$$= \frac{(0.2)(0.3)}{(0.3)(0.1) + (0.5)(0.2) + (0.2)(0.3)}$$

$$= \frac{6}{19}$$

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Hint

$$P(I|B) = \frac{P(B|I) \times P(I)}{P(I) \cdot P(B|I) + P(2) \cdot P(B|2)}$$