(12) Bayes Theorem

$$P(\text{Com } F / Al) = \frac{P(Al+/F) * P(F)}{P(Al+/F) + P(F) + P(Al-/\sim F)\, P(\sim F)}$$

$$= \frac{92 \times 0.1}{92 \times 0.1 + 90 \times 0.9} = \frac{92}{173} = \underline{\underline{0.53}}$$

(13) People died with renal failure $d_{rf} = 321$

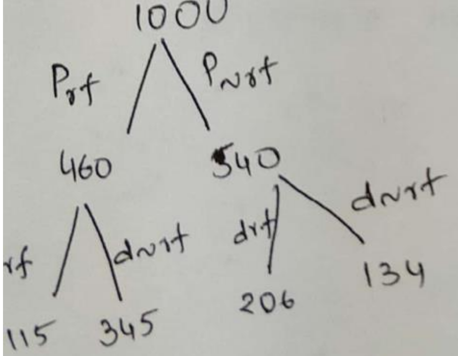
People with atleas 1 parent with rf $P_{rf} = 460$

People died with rf & has atleast 1 parent with rf $= 115$

Total deaths = 1000

Pobability of neither of his/her parents has rf if he dies of rf

$$P(d_{rf} / P_{\sim rf}) = \underline{\underline{\frac{206}{540}}}$$



Above solution for 13th problem is using conditional probability. Below one is using Bayes theorem. Results are same using both the ways.

(13)

1000

D+ve — 321, D-ve — 679

321: P+ve — 115, P-ve — 206

679: P+ve — 345, P-ve — 334

$$P(D+ve / P-ve) = \frac{P(P-ve / D+ve) \times P(D+ve)}{P(P-ve / D+ve) \times P(D+ve) + P(P-ve / D-ve) \times P(D-ve)}$$

$$= \frac{\frac{206}{\cancel{321}} \times \frac{\cancel{321}}{1000}}{\frac{206}{\cancel{321}} \times \frac{\cancel{321}}{1000} + \frac{334}{\cancel{679}} \times \frac{\cancel{679}}{1000}} = \frac{206}{540}$$

(14) $P(S) = 1/10000$

$P(\sim S) = 9999/10000$

S — 1, NS — 9999

1: +ve — 100, -ve — 0 (FN)

9999: +ve — 1 (FP), -ve — 99

Considering the case if test gives +ve probability of having swine flue

$$P(S / +ve) = \frac{P(+ve / S)\, P(S)}{P(+ve / S)\, P(S) + P(+ve / \sim S)\, P(\sim S)}$$

$$= \frac{\frac{100}{100} \times \frac{1}{10000}}{\frac{100}{100} \times \frac{1}{10000} + \frac{1}{100} \times \frac{9999}{10000}} = \frac{100}{10099} \approx 0.009$$

≈ 0.01