(1)

$P_X(x) = \binom{n}{x} p^x (1-p)^{n-x}$ head ← ٫۵ , tail ← ٫۵ ⟹ $P_X(x) = \binom{10}{5} ٫۵^5 (1-٫۵)^5 = 0,246$ (1a)

head ← ٫۶ + head ← ٫۷ + head ← ٫۸ + head ← ٫۹ + head ← ۱٫۰ ⟹ $P_X(6)+P_X(7)+P_X(8)+P_X(9)+P_X(10)$ (1b

$\binom{10}{6} ٫۵^6 (1-٫۵)^4 + \binom{10}{7} ٫۵^7 (1-٫۵)^3 + \cdots = 0,377$

(2)

$P(A|B) = \frac{P(A \cap B)}{P(B)}$

$P(A \cap B) = P(A) \cdot P(B|A)$

$P(A|B) = \frac{P(A) \cdot P(B|A)}{P(B)}$,

$P(A|B) = \frac{P(A) \cdot P(B|A)}{P(A) \cdot P(B|A) + P(A') \cdot P(B|A')}$

A = ست شست

B = دارای اشتال ، B' = دارای اشتال نباشد

$P(A|B') = 0,999$

$P(B') = 0,2$, $P(B) = 0,98$

$P(A|B) = 0,005 \longrightarrow P(B'|A) = ?$

$P(A) = P(A|B') \cdot P(B') + P(A|B) \cdot P(B) = 0,999 \times 0,2 + 0,005 \times 0,98 = 0,1998 + 0,0049 = \boxed{0,2488}$

$P(B'|A) = \frac{P(A|B') \cdot P(B')}{P(A)} = \frac{0,999 \times 0,2}{0,2488} = \frac{0,1998}{0,2488} \simeq \boxed{0,803} \longrightarrow \%80,3$

(3)

$P(A|B) = 0,4$ $P(A \cap B) = ?$, $P(A' \cap B) = ?$

$P(B) = 0,5$ $P(A|B) = \frac{P(A \cap B)}{P(B)} \longrightarrow 0,4 = \frac{P(A \cap B)}{0,5} \longrightarrow \boxed{P(A \cap B) = 0,2}$

$P(A' \cap B) = P(B) - P(A \cap B) = 0,5 - 0,2 = \boxed{0,3}$

(4)

$P(S) = 0,4$, $P(P) = 0,25$, $P(L) = 0,35$

$P(D|S) = 0,01$, $P(D|P) = 0,01$, $P(D|L) = 0,02$

$P(D) = P(D|S)P(S) + P(D|P)P(D) + P(D|L)P(L) = (0,01 \times 0,4) + (0,01 \times 0,25) + (0,02 \times 0,35) = \boxed{0,0135}$

$P(L|D) = \frac{P(D|L) \times P(L)}{P(D)} = \frac{0,02 \times 0,35}{0,0135} \simeq \boxed{0,5185}$

(5)

(a $P_X(x) = \binom{n}{x} p^x (1-p)^{n-x}$

تعداد افراد سیگاری = x ، $p = 0,13$ و $p' = 1-p = 0,87$ ، $n = 5$

$P_X(5) = (1-p)^4 \times p = 0,13 \times (0,87)^4 = 3,71 \times 10^{-5}$

(b $P_X(3) = \binom{5}{3} (0,13)^3 (0,87)^2 = 0,0166$

(c $P(X \geq 1) = 1 - P(X=0) \longrightarrow P(X=0) = \binom{5}{0} (0,13)^0 (0,87)^5$

$P(X \geq 1) = 1 - P(X=0) = 0,5016$

(d $P_X(4) + P_X(5) = \binom{5}{4} (0,13)^4 (0,87)^1 + \binom{5}{5} (0,13)^5 (0,87)^0 = 0,00128$

(6)

A = زنده بودن فرد $P(A) = 2/3$

B = زنده تصادف نکند $P(B|A) = 5\,P(B|A')$

$P(B|A') = 0,1$

$P(A|B) = ?$

$P(A|B) = \frac{P(B|A) \cdot P(A)}{P(B)} = \frac{0,5 \times 2/3}{0,36} \simeq \boxed{0,907}$

$P(B) = P(B|A) \cdot P(A) + P(B|A') \cdot P(A') = (0,5 \times 2/3) + (0,1 \times 1/5) = 0,36$