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3.1 1) P(1^{st} die shows ~~odd~~ #) = ~~18/36~~ P(odd # first die). P(anything 2^{nd} die)

$= \frac{3}{6} \cdot 1$

$= \frac{3}{6} = \boxed{\frac{1}{2}}$

2) P(Σ of 2 dice = 11) → possible options are (5,6) & (6,5)

therefore: $\frac{2}{36} = \boxed{\frac{1}{18}}$

3.4

i) $\boxed{\frac{16}{5322}}$

ii) $\boxed{\frac{77}{7019}}$

iii) P(smoking) = $\frac{7019}{12341}$ P(LC) = $\frac{93}{12341}$

P(smoking ∩ LC) = $\boxed{\frac{77}{12341}}$

To be independent: $P(A \cap B) = P(A)P(B)$

$\frac{77}{12341} \neq \left(\frac{7019}{12341}\right)\left(\frac{93}{12341}\right)$

Therefore they are not independent

3.4 iv) $P(S|LC) = \frac{P(LC \cap S)}{P(LC)} = \frac{\frac{77}{12341}}{\frac{93}{12341}} = \frac{77}{12341} \times \frac{12341}{93}$

$= \boxed{\frac{77}{93}}$

3.7) $P(D) = 0.6$ $P(T|D) = 0.9$

$P(D^c) = 0.4$ $P(T^c|D^c) = 0.9$

1. $P(D|T) = \frac{P(T|D) \cdot P(D)}{P(T)}$

following textbook formula

$P(T) = P(T|D) \cdot P(D) + [1 - P(T^c|D^c)][1 - P(D)]$ — (1)

$= (0.9)(0.6) + (0.1)(0.4)$

$= 0.58$

$\therefore P(D|T) = \frac{0.54}{0.58} = \frac{54}{58} = \boxed{\frac{27}{29}}$

2. atleast 95% i.e 0.95

So applying formula we get

$\frac{0.54}{(0.9)(0.6) + (1-s)0.4} \geq 0.95$ using formula similar to 1

$\Rightarrow \frac{0.54}{0.54 + (1-s)0.4} \geq 0.95$

$\Rightarrow 0.54 \geq 0.95(0.54 + 0.4 - 0.4s)$

$\Rightarrow 0.54 \geq 0.513 + 0.38 - 0.38s$

$\Rightarrow 0.027 \geq -0.38s$

$\therefore s \geq \frac{0.027}{0.38} = \boxed{0.928}$ i.e 92.8%

3. not diseases i.e $P(D^c) = 0.4$

$\frac{(0.4)(0.9)}{(0.9)(0.4) + (1-s)0.6} \geq 0.95$ using formula similar to 1

$\frac{0.36}{0.36 + 0.6 - 0.6s} \geq 0.95$

$0.36 \geq 0.95(0.36 + 0.6 - 0.6s)$

$0.36 \geq 0.912 - 0.57s$ $0.57s \geq 0.552$

$s \geq \frac{0.552}{0.57} = \boxed{0.968}$ i.e 96.8%

1) $P(\text{Success} \cap \text{open}) \Rightarrow \frac{273}{700}$

2) $P(\text{open surgery}) \Rightarrow \frac{350}{700}$

3) $P(\text{success} \mid \text{open}) \Rightarrow$

$$\Rightarrow \frac{P(\text{success} \cap \text{open})}{P(\text{open})} \Rightarrow \frac{273}{350}$$

4) You can compare the conditional probability of success given an open surgery and small incision

$$\therefore P(\text{success} \mid \text{open}) \Rightarrow \frac{273}{350}$$

Similarly $P(\text{success} \mid \text{incision}) \Rightarrow \frac{P(\text{success} \cap \text{incision})}{P(\text{incission})}.$

$$\Rightarrow \frac{289}{350}.$$