

SOA Exam P 025 (General Probability)

Let D = Disease

D^c = No Disease

P = Presence

P^c = Non-Presence

Given: $\Pr(P|D) = 0.95$

$\Pr(P|D^c) = 0.005$

$\Pr(D) = 0.01$

Find: $\Pr(D|P) = ?$

$$\begin{aligned}\Rightarrow \Pr(D^c) &= 1 - \Pr(D) \\ &= 1 - 0.01 \\ &= 0.99\end{aligned}$$

Solutions:

$$\Pr(D|P) = \frac{\Pr(P|D)\Pr(D)}{\Pr(P)}$$

$$\Pr(P) = \Pr(P|D)\Pr(D) + \Pr(P|D^c)\Pr(D^c)$$

Given: $\Pr(P|D) = 0.95$

$$\frac{\Pr(P|D)\Pr(D)}{\Pr(D)} = 0.95 \Rightarrow \Pr(P|D)\Pr(D) = 0.95 \times 0.01 = 0.0095$$

$\Pr(P|D^c) = 0.005$

$$\frac{\Pr(P|D^c)\Pr(D^c)}{\Pr(D^c)} = 0.005 \Rightarrow \Pr(P|D^c)\Pr(D^c) = 0.005 \times 0.99 = 0.00495$$

$$\begin{aligned}\Rightarrow \Pr(P) &= 0.0095 + 0.00495 \\ &= 0.01445\end{aligned}$$

$$\Pr(D|P) = \frac{0.0095}{0.01445} = 0.6574$$

ANS: B