

# Parte 1

NO contaminado = 99.5%  $\rightarrow 0.995 \rightarrow P(A')$

Contaminado = 0.5%  $\rightarrow 0.005 \rightarrow P(A)$

Efectividad = 97%  $\rightarrow 0.97 \rightarrow P(B|A)$

Falso positivo = 0.1%  $\rightarrow 0.001 \rightarrow P(B|A')$

a) Probabilidad de tener realmente el virus?

$$P(A|B) = \frac{P(A \cap B) * P(A)}{P(B)} \rightarrow \text{Bayes}$$

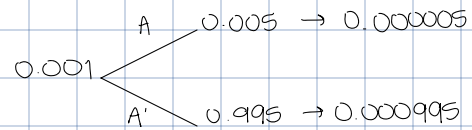
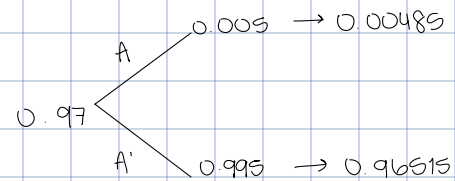
$$P(B) = ?$$

$$P(B) = P(B|A)P(A) + P(B|A')P(A')$$

$$P(B) = (0.97)(0.005) + (0.001)(0.995)$$

$$P(B) = (0.00485) + 0.000995$$

$$P(B) = 0.005845$$



$$P(A|B) \rightarrow \frac{0.005 * 0.97}{0.005845}$$

$$P(A|B) = 0.8297 \rightarrow 82.97\%$$

P

La probabilidad de realmente tener el virus es del 82.97%.

b) NO. de personas = 5

NO. de positivos = 3

NO. 2 infect. dado 3 = 2

$P(A')$   $\rightarrow$  Prob. NO positivo

$P(A)$   $\rightarrow$  prob. 3 perso. positivas

$P(B|A)$   $\rightarrow$  Prob. infectada dado positivo

$\rightarrow$  Prob. 3 esten infectados de 5

$$P(X=3) = C\left(\frac{3}{5}\right) 0.00585^3 (1-0.00585)^{5-3}$$

$$P(X=3) = C\left(\frac{3}{5}\right) 0.00000202 (0.988)$$

$$P(X=3) = 0.00019781$$

$\rightarrow$  Prob. que de 3 personas 2 esten infectadas

$$P(X=2) = C\left(\frac{3}{2}\right) 0.8297^2 (1-0.8297)^{3-2}$$

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$$P(X=2) = C\left(\frac{3}{2}\right) 0.6884 (0.1703)^1$$

$$P(X=2) = 0.3517$$

$$P(X=3) = C\left(\frac{3}{3}\right) 0.8297 (1-0.8297)^{3-3}$$

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$$P(X=3) = C\left(\frac{3}{3}\right) 0.6884 (0.1703)^0$$

$$P(X=3) = 0.57116$$

$$P(2,3) = 0.3517 + 0.57116 = 0.9228 \approx 92\%$$