Suppose that the four inspectors at a film factory are supposed to stamp the expiration date on each package of film at the end of the assembly line. John, who stamps 20% of the packages, fails to stamp the expiration date once in every 200 packages; Tom, who stamps 60% of the packages, fails to stamp the expiration date once in every 100 packages; Jeff, who stamps 15% of the packages, fails to stamp the expiration date once in every 90 packages; and Pat, who stamps 5% of the packages, fails to stamp the expiration date once in every 200 packages. If a customer complains that his/her package of film does not show the expiration date, what is the probability that it was inspected by John?

John 20% falha 1/200

Tom 60% falha 1/100

Jeff 15% falha 1/90

Pat 5% falha 1/200

temos que a probabilidade de o erro ter sido de John é de

$$P(John|Sem) = \frac{P(Sem|John) \cdot P(John)}{P(Sem)}$$

$$P(Sem) = P(John)\,P(Sem|John) + P(Tom)\,P(Sem|Tom) + P(Jeff)\,P(Sem|Jeff) + P(Pat)\,P(Sem|Pat)$$

$$P(Sem) = \frac{0.2}{200} + \frac{0.6}{100} + \frac{0.15}{90} + \frac{0.05}{200} \cong 0,00892$$

então $P(\text{Jonh} \mid \text{Sem}) = \frac{P(\text{Sem} \mid \text{Jonh})\, P(\text{Jonh})}{P(\text{Sem})} = \frac{0,2/200}{0,00892}$

$$P(\text{Jonh} \mid \text{Sem}) = 0,11215$$