Question #6891 The probability that an American industry will locate in Cebu City 0.7, the probability that it will locate in Cagayan City is 0.4, and the probability that it will locate in either Cebu City or Cagayan City or both is 0.8. What is the probability that the industry will locate (a) in both cities? (b) in neither city?.

Solution. Denota by A – the event (an American industry will locate in Cebu City), B — the event (an American industry will locate in Cagayan City) , then $\mathsf{P}(A) = 0.7$ and $\mathsf{P}(B) = 0.4$, $\mathsf{P}(A \cup B) = 0.8$. The event C =(an American industry will locate in both cities) equals $A \cap B$, and the event D =(an American industry will not locate in the mentioned cities)= $\overline{A \cup B}$. Thus, by inclusion-exclusion principle $\mathsf{P}(C) = \mathsf{P}(A) + \mathsf{P}(B) - \mathsf{P}(A \cup B) = 0.7 + 0.4 - 0.8 = 0.3$, hence $\mathsf{P}(D) = 1 - \mathsf{P}(A \cup B) = 1 - 0.8 = 0.2$.

Answer. a)0.3, b) 0.2.