$$P(A \cap B) = \frac{P(A)}{P(A \cup B)} + \frac{P(B)}{P(A \cup B)} - 1$$

→ you said this.

$$= \frac{P(A) + P(B) - P(A \cup B)}{P(A \cup B)}$$

$$= \frac{P(A) + P(B) - [P(A) + P(B) - P(A \cap B)]}{P(A \cup B)}$$

$$P(A \cap B) = \frac{P(A \cap B)}{P(A \cup B)}$$

→ only true if - $P(A \cap B) = 0$ or
$$P(A \cup 1) = 1$$

which is **not** this case !

3.19 is much simpler:
$$P(A \cap B) = P(A \cup B) - P(A) - P(B)$$
$$= 0.9 - 0.3 - 0.7 = 0.1$$