ASSIGNMENT 1

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Q.11.13.3.15
If E and F are events such that $\Pr(E) = \frac{1}{4}$, $\Pr(F) = \frac{1}{2}$ and $\Pr(EF) = \frac{1}{8}$, find
(i) $\Pr(E + F)$
(ii) $\Pr(E'F')$

solution
(i) $\Pr(E + F)$
Using Set theory, For two events A and B, we know that,

$$\Pr(A + B) = \Pr(A) + \Pr(B) - \Pr(AB) \qquad (1)$$

$$\rightarrow \Pr(E + F) = \Pr(E) + \Pr(F) - \Pr(EF) \qquad (2)$$

$$\Rightarrow \Pr(E + F) = \frac{1}{4} + \frac{1}{2} - \frac{1}{8} = \frac{5}{8} \qquad (3)$$

$$\therefore \boxed{\Pr(E + F) = \frac{5}{8}} \qquad (4)$$

(ii) $\Pr(E'F')$
Using set theory, For two events A and B, we know that,

$$\Pr(A'B') = (\Pr(A + B))' \qquad (5)$$

$$\rightarrow \Pr(E'F') = (\Pr(E + F))' \qquad (6)$$

$$\Rightarrow \Pr(E'F') = 1 - \Pr(E + F) \qquad (7)$$

$$\Rightarrow \Pr(E'F') = 1 - \frac{5}{8} = \frac{3}{8} \qquad (8)$$

$$\therefore \boxed{\Pr(E'F') = \frac{3}{8}} \qquad (9)$$