If A and B are two events such that $P(A) = \frac{1}{4}$, $P(B) = \frac{1}{2}$ and $P(A \cap B) = \frac{1}{8}$, find P (not A and not B).

Solution:

Given, $P(A) = \frac{1}{4}$, $P(B) = \frac{1}{2}$ and $P(A \cap B) = \frac{1}{8}$.

P (not on A and not on B) = $P(A' \cap B')$

P (not on A and not on B) = $P\left((A \cup B)'\right)$ $\qquad \left[A' \cap B' = (A \cup B)'\right]$

$= 1 - P(A \cup B)$

$= 1 - \left[P(A) + P(B) - P(A \cap B)\right]$

$= 1 - \left[\frac{1}{4} + \frac{1}{2} - \frac{1}{8}\right]$

$= 1 - \frac{5}{8}$

$= \frac{3}{8}$