

Assignment 1

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1 PROBLEM

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 $P(\text{not A and not B})$.

2 SOLUTION

$P(\text{not A and not B})$ is equivalent to $P(A'B')$.
from De-morgan's law,

$$(A'B') = (A + B)' \quad (2.0.1)$$

$$(2.0.2)$$

So, $P(A'B')=P((AB)')$

$$P((A + B)') = 1 - P(AB) \quad (2.0.3)$$

$$= 1 - (P(A) + P(B) - P(AB)) \quad (2.0.4)$$

$$= 1 - \left(\frac{1}{4} + \frac{1}{2} - \frac{1}{8}\right) \quad (2.0.5)$$

$$= \frac{3}{8} \quad (2.0.6)$$

$$(2.0.7)$$

Therefore,

$$P((A + B)') = \frac{3}{8} \quad (2.0.8)$$

$$\Rightarrow P(A'B') = \frac{3}{8} \quad (2.0.9)$$

$$(2.0.10)$$

So, $P(\text{not A and not B})=\frac{3}{8}$

Here the sky blue colored region is the required region and that is $P(\text{not A and not B})$

