

Assignment 1

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Download all python codes from

https://github.com/sachinkarumanchi/probability_and_random_variables/blob/assignment1/assignment1.py

and latex-tikz codes from

https://github.com/sachinkarumanchi/probability_and_random_variables/blob/assignment1/Assignment1.tex

1 PROBLEM

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

2 SOLUTION

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

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

So,

$$\Pr(A'B') = \Pr((A + B)') \quad (2.0.2)$$

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

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

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

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

Therefore,

$$\Pr((A + B)') = \frac{3}{8} \quad (2.0.7)$$

$$\implies \Pr(A'B') = \frac{3}{8} \quad (2.0.8)$$

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

In the venn diagram the sky blue colored region is the required and that is $\Pr(\text{not A and not B})$.

