## HW #27

For the cases $n=2$, $n=3$ prove sum & product formulae are equal

$n=2$

product: $1-\prod_{n=1}^{N}\left[1-P(A_n)\right] = 1-(1-P(A_1))(1-P(A_2)) = 1-(1-P(A_1)-P(A_2)+P(A_1)P(A_2))$

$\to 0$, small chance

$= P(A_1)+P(A_2)-\cancel{P(A_1)P(A_2)} = P(A_1)+P(A_2)$

sum: $\sum_{n=1}^{2} P(A_n) = P(A_1)+P(A_2)$

product & sum for $n=2$ are the same

$n=3$

product: $1-\prod_{n=1}^{N}\left[1-P(A_n)\right] = 1-(1-P(A_1))(1-P(A_2))(1-P(A_3))$

$\to 0$,

$= 1-(1-P(A_1)-P(A_2)+\cancel{P(A_1)P(A_2)})(1-P(A_3))$

$= 1-(1-P(A_3)+P(A_1)P(A_3)+P(A_2)P(A_3))-P(A_2)-P(A_3))$

$= P(A_1)+P(A_2)+P(A_3)$

sum: $\sum_{n=1}^{3} P(A_n) = P(A_1)+P(A_2)+P(A_3)$

product & sum for $n=3$ are the same

- I am not writing a one-page summary
- They use Boolean Algebra.