MDL ASSIGNMENT 3 Q3

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Question 3.a: An aeroplane is built to be able to fly on one engine. If the plane' s two engines operate independently, and each has a 1% chance of failing in any given four-hour flight, what is the chance the plane will fail to complete a four-hour flight to Oklahoma due to engine failure?

ANSWER: Let probability of one engine failing in a 4 hour flight be x% Number of engine in plane = 2 The probability of both of the engine failing in the four hour flight will be probability of one engine failing * probability of other engine failing because both of events are independent as given in the question. Therefore the probability of both failing (p) = $x\% * x\%$
Hence $p = x^2/100\%$
putting x = 1
then, p = 0.01%

Question 3.b: In a roomful of 30 people, what is the probability that at least two people have the same birthday? Assume birthdays are uniformly distributed and there is no leap year complication
Answer: The probability of at least two people out of 30 people having same birthday is complimented by no two people having the same birthday. Then, the probability of no two people having same birthday = $\frac{\prod_{i=0}^{29}(365-i)}{365^{30}} = 0.293683757$

therefore the probability of atleast two people having same birthday is $1 - 0.293683757 = 0.706316243$