1. What is the probability of a CDO failing to pay out if it consists of 10 loans, each with independent failure probability of 0.1?

$$\mathbb{P}(''CDO\ \ fails\ \ to\ \ pay\ \ out'') = \mathbb{P}(''every\ \ loan\ \ fails'')$$

Since the probability of failure of each bond is independent and equal to 0.1:

$$\mathbb{P}(''every\ \ loan\ \ fails'') = (0.1)^{10} = 10^{-10} = 0.0000000001$$

The probability that the CDO fails to pay out is 10^{-10}.

2. How many independent subprime loans, each with failure probability 0.5, are needed to create a triple-A CDO (failure risk < 0.0012)?

$$failure\ \ risk = \mathbb{P}(''CDO\ \ fails\ \ to\ \ pay\ \ out'') = (0.5)^n$$

where n is the number of loans.

$n = 9$:

$$failure\ \ risk = (0.5)^9 = 0.00195$$

$n = 10$:

$$failure\ \ risk = (0.5)^{10} = 0.000977$$

Therefore, at least 10 independent subprime loans are needed.