HW 1

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Solution 1.a

As each of the 5 different colored dice can have 12 different numbers, the total number of atomic events is 12^5.

Solution 1.b

The probability of each atomic event is $\frac{1}{12^5}$.

Solution 1.c

We can choose any one number from 12 different numbers. Then, for that number, we can choose 3 different colors out of 5. After, choosing the first number, we will be left with 11 numbers from which we have to choose one. Then for this number, we can choose 2 out of 5 different colors. Therefore, the total number of events are:

$$\text{Total number of events } = \binom{12}{1}\binom{5}{3}\binom{11}{1}\binom{5}{2} = 13200.$$

Therefore, the probability of rolling a full house is $\frac{13200}{12^5} = 0.053$.

Solution 1.d

For four of a kind, we can choose any one number out of 12, then for this number we can choose any 4 colors out of 5. The other number can be chosen from 11 different numbers and for this number we will have choice of 1 color out of 5 different colors. Therefore, the total number of events are:

$$\text{Total number of events } = \binom{12}{1}\binom{5}{4}\binom{11}{1}\binom{5}{1} = 3300.$$

Therefore, the probability of four of a kind is $\frac{3300}{12^5} = 0.013$.