QUESTION NO.1

1. Ways to obtain the event:

The number of ways to obtain the event of getting the number 8 exactly 3 times (not necessarily in a row) when throwing a 10-sided die 6 times can be calculated using the combination formula:

C(n, k) = n! / (k! \* (n-k)!)

In this case:

C(6, 3) = 6! / (3! \* 3!)

This calculation yields the number of ways to obtain the specified event.

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2. Probability of the event:

The probability (P) of the event occurring is given by:

P(event) = (Number of ways event can occur) / (Total possible outcomes)

For a 10-sided die thrown 6 times, the total possible outcomes are 10^6. Therefore,

P(event) = (Number of ways event can occur) / 10^6

This gives the probability of the described event.

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3. Expected number of throws:

The expected number of throws (E(X)) to get the number 8 is calculated using the formula:

E(X) = Σ(xi \* P(X = xi))

Here, xi represents the number of throws needed to get an 8, and P(X = xi) is the probability of getting an 8 on the i-th throw.

The expected value is influenced by the fact that the event doesn't have to occur consecutively, so different scenarios (e.g., 8 on the first throw, 8 on the second throw, etc.) should be considered.

QUESTION No. 2

1. A' ∪ B:

A' = {1, 5, 6, 7, 8, 9, 10}

A' ∪ B = {1, 3, 4, 5, 6, 7, 8, 9, 10}

2. A' ∩ B:

A' = {1, 5, 6, 7, 8, 9, 10}

A' ∩ B = {5, 6, 7}

3. (A' ∩ B')':

A' = {1, 5, 6, 7, 8, 9, 10}

B' = {1, 2, 8, 9, 10}

(A' ∩ B')' = {2, 3, 4, 5, 6, 7}

4. ((A ∩ (B ∪ C))')':

B ∪ C = {3, 4, 5, 6, 7}

A ∩ (B ∪ C) = {3, 4}

((A ∩ (B ∪ C))')' = {3, 4, 5, 6, 7}

5. (((A ∩ (B ∪ C))' )' )

B ∪ C = {3, 4, 5, 6, 7}

A ∩ (B ∪ C) = {3, 4}

((A ∩ (B ∪ C))') = {1, 2, 5, 6, 7, 8, 9, 10}

(((A ∩ (B ∪ C))')') = {3, 4, 5, 6, 7}