Conditional Expectation (we branch to different loops based on our random variable):
$$ET(n) = \sum_{q=1}^n E(X \mid A) \operatorname{\mathbf{Prob}}(A) + E(X \mid A) \operatorname{\mathbf{Prob}}(A) + E(X \mid A) \operatorname{\mathbf{Prob}}(A)$$

our summations with. can then use to solve the rest of This will give us a value that we

probability is. may not be done but the After this point, the problem

$$u > rac{1}{2} + (u) \log (u) = rac{1}{2} = u$$

Normal Expectation (one of the loops executes some random amount of times):
$$\mathbf{E}T(n) = \sum_{q=1}^n T(k=q) \cdot \mathbf{Prob}(k=q)$$

random, we can find the formula

Now that we know what parts are

expectation. because of the linearity of the rest of our calculation value, we can us that result for Once we determine the expected

 $+E(T(n)\mid k>rac{n}{2})$ Frob $(k>rac{n}{2})$ $(\frac{n}{2} \geq \lambda) \operatorname{dor} \left(\frac{n}{2} \geq \lambda \mid (n)T\right) = \sum_{n=0}^{\infty} (n)TT$

expected value. selected, we can solve to find the With the appropriate formula

Expectation code(1). From the Condtional

randomness. later on, we want to isolate the To make things easier for us





that fits best.

Aalue Find the Expected

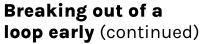




Locate the Breaking out of a

Randomness

loop early





Tips and Tricks:

 Recursive probelms will follow the Conditional Expectation Formula

When there's a random element that causes a loop to exit early, we use the **Normal Expectation** Formula and the following probability:

$$\sum_{i=1}^n \mathbf{Prob}(x \leq i)$$

Where x is the number of times that we don't exit early.

Now we can simplify the probability

$$\mathbf{Prob}(x \leq 1) = \mathbf{Prob}(x \leq 1)$$

$$\mathbf{Prob}(x \leq 2) = \mathbf{Prob}(x \leq 1)^2$$

$$\mathbf{Prob}(x \le 3) = \mathbf{Prob}(x \le 1)^3$$

$$\mathbf{Prob}(x \leq q) = \mathbf{Prob}(x \leq 1)^q$$

After simplifying, we find that the sum is geometric.

$$\sum_{q=1}^n \mathbf{Prob}(x \leq q)^q$$

A Guide to **Finding Expected** Value