Lecture 12.3

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Random(a,b) reports an integer with $a \leq r \leq b$, uniformly at random, i.e. $\Pr[Random(a,b) = r] = \frac{1}{b-a+1}$ for all $a \leq r \leq b$. We assume Random runs in $O(1)$ time.

A trivial algorithm for the approximate median problem reports a random item from the stream, i.e. by returning the $Random(0, m-1)$ item. *(Note: reporting the first item does not work because it is not necessarily a randomly picked element.)*
Such an algorithm reports a $\frac{1}{4}$-approximate median with probability $\frac{1}{2}$.