$$E[x] = \sum_{i=1}^{n-1} \sum_{j=i+1}^{n} \frac{2}{j-i+1} \qquad \boxed{j-i=k}$$

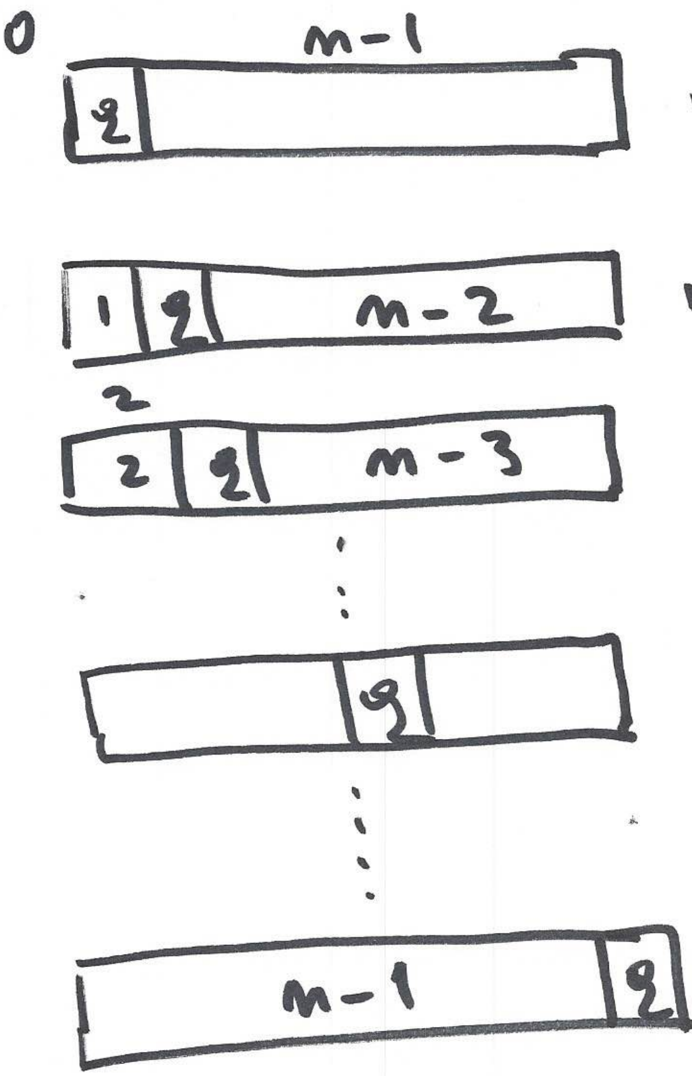
$$j = i+1 \Rightarrow k = i+1-i = 1$$

$$j = n \Rightarrow k = n-i$$

$$E[x] = \sum_{i=1}^{n-1} \underbrace{\sum_{k=1}^{n-i} \frac{2}{k+1}} \leq \sum_{i=1}^{n-1} \sum_{k=1}^{n} \frac{2}{k}$$

$$\leq \sum_{k=1}^{n} \frac{2}{k+1} \leq \underbrace{\sum_{k=1}^{n} \frac{2}{k}}_{O(\lg n)}$$

$$E[x] \leq \sum_{i=1}^{n-1} O(\lg n) = \boxed{O(n \lg n)}$$



$$\max\left(T(0),\ \underline{T(n-1)}\right)\cdot\frac{1}{n}$$

$$\max\left(T(1),T(n-2)\right)\cdot\frac{1}{n}$$

$$\max\left(T(2),T(n-3)\right)\cdot\frac{1}{n}$$

$$\vdots$$

$$\max\left(T\left(\frac{n}{2}\right),T\left(\frac{n}{2}\right)\right)\cdot\frac{1}{n}$$

$$\vdots$$

$$\underbrace{\max\left(T(n-1),T(0)\right)}\cdot\underbrace{\frac{1}{n}}$$

$$\sum\left(\text{outcomes} \times \text{prob}\right)$$