So

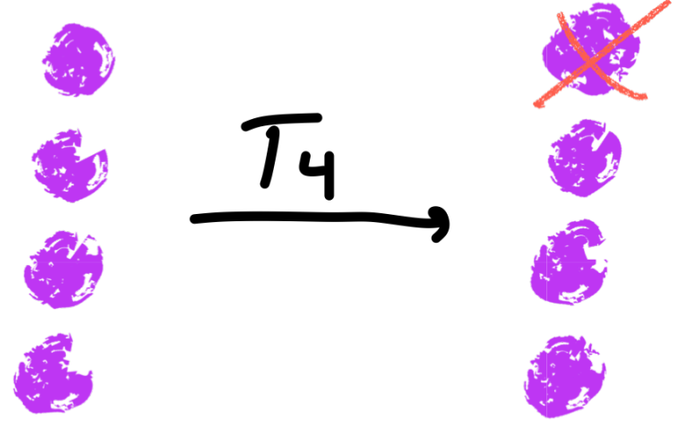
$$\mathbb{E}\left[T_{20\to 0}\right] = \mathbb{E}\left[T_{20}\right] + \mathbb{E}\left[T_{19}\right] + \dots \mathbb{E}\left[T_1\right]$$

$$= 1 + \frac{20}{19} + \dots + \frac{20}{1} = 1 + 20\sum_{i=1}^{19} \frac{1}{i}$$

Question: How many classes do you expect until all 20 students have been called on?

When there are i students left to call on, the prob of rolling one of these remaining i is $\frac{i}{20}$

$$\mathbb{E}[T_i] = \frac{1}{i/20} = \frac{20}{i}$$



Cole-escent theory

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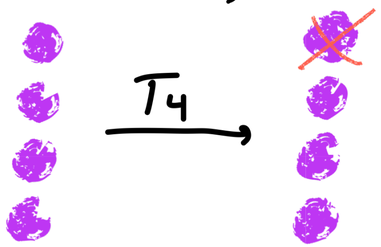

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*Col*e-escent theory

Generalize: Class size N (and N-sided die)
sample of $n \leq N$ students