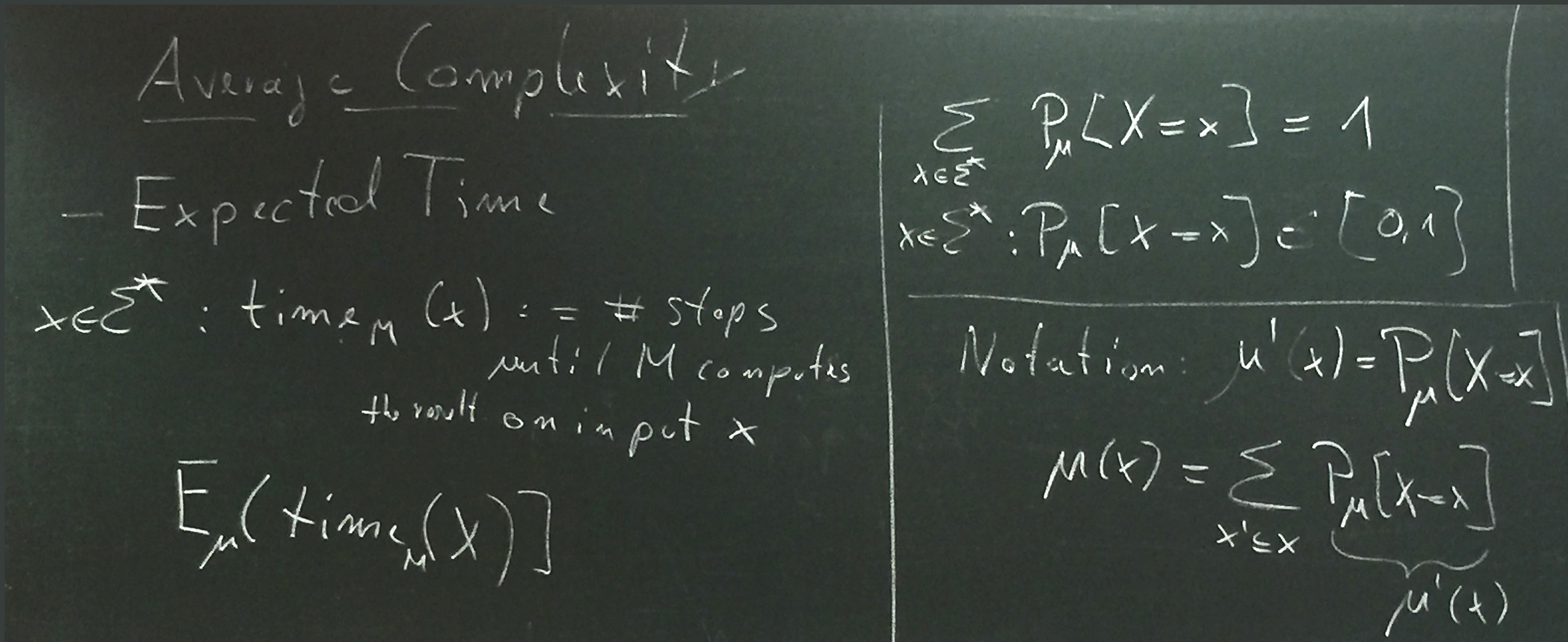
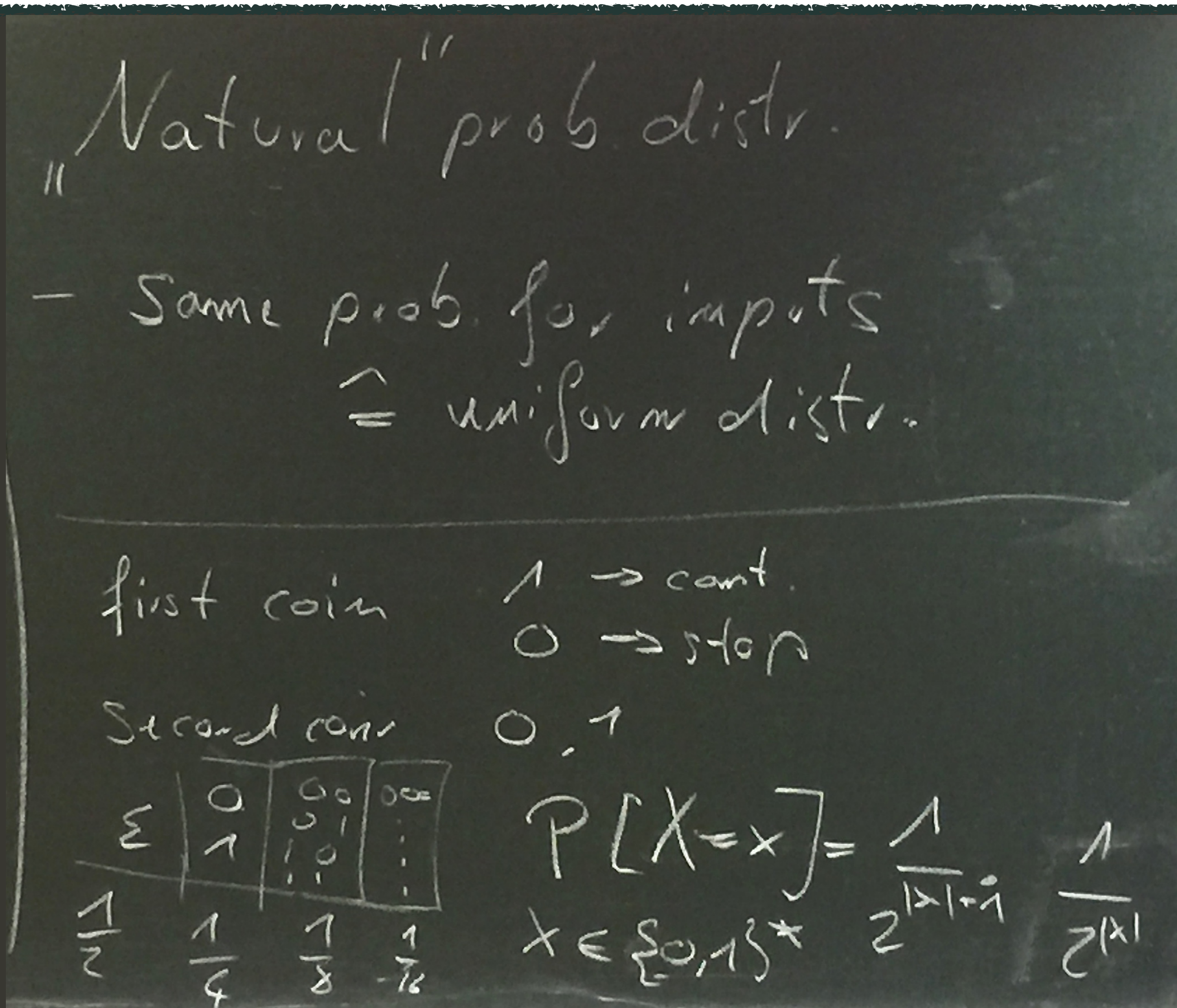
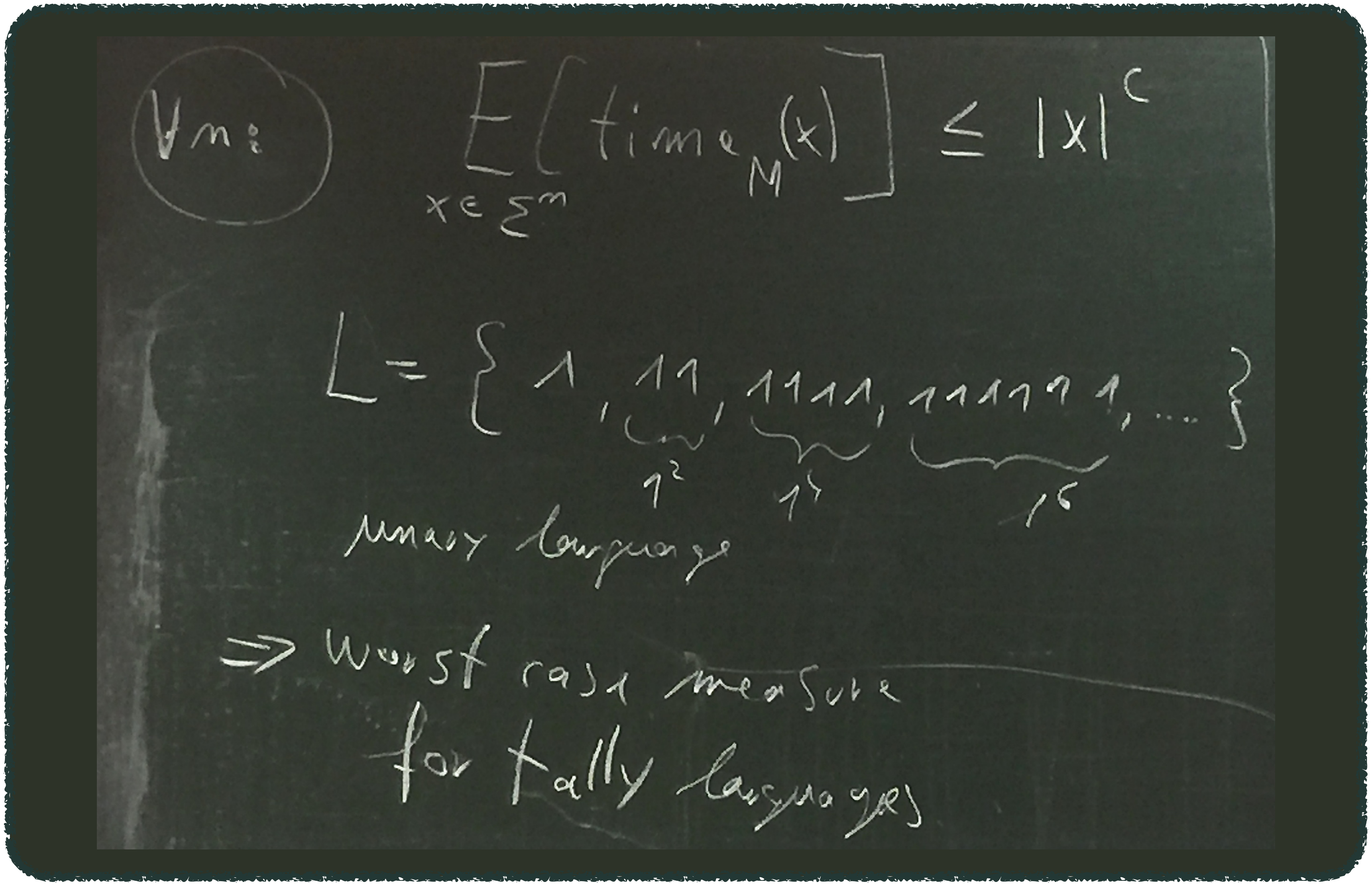
20 Average-P, DisNP



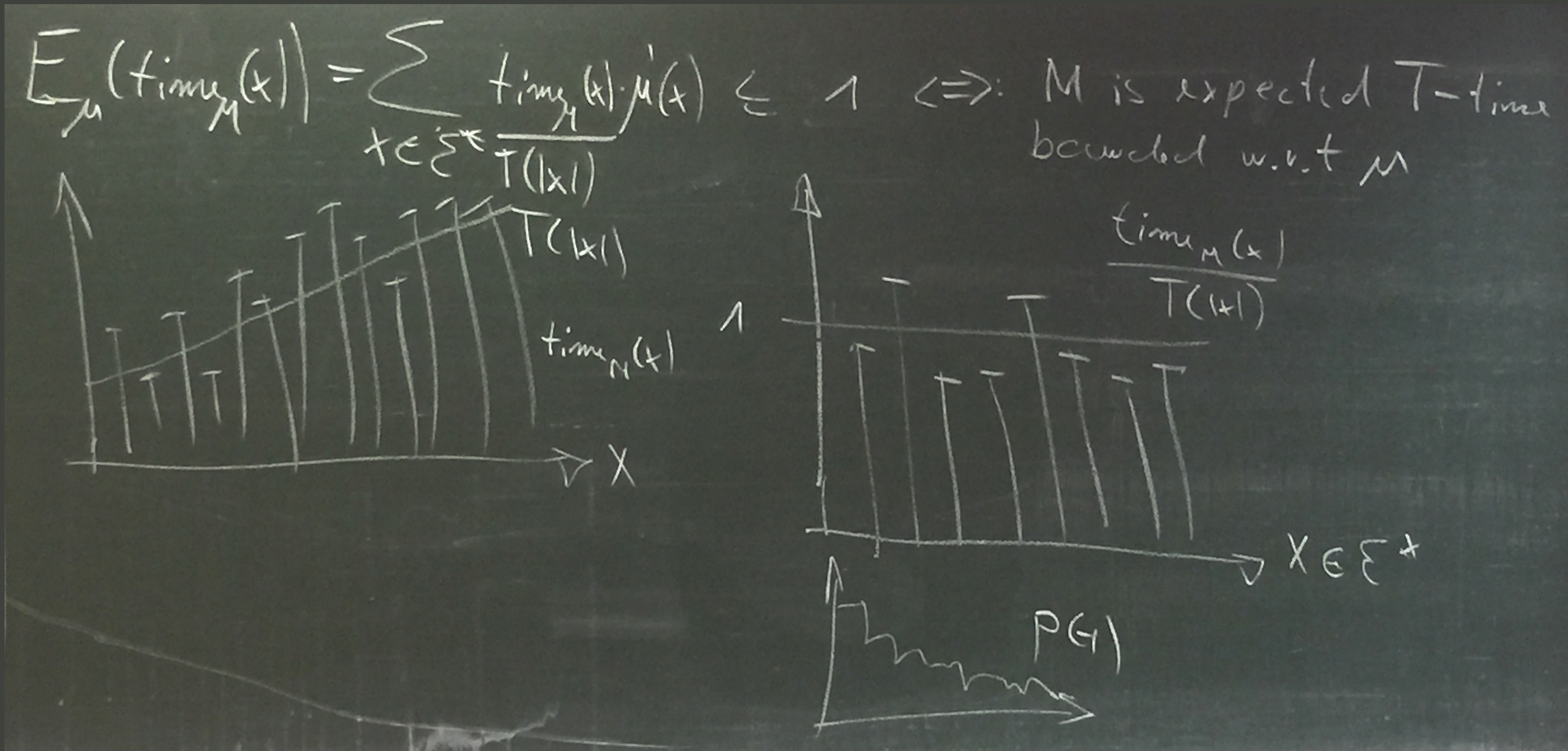
20 Average-P, DisNP



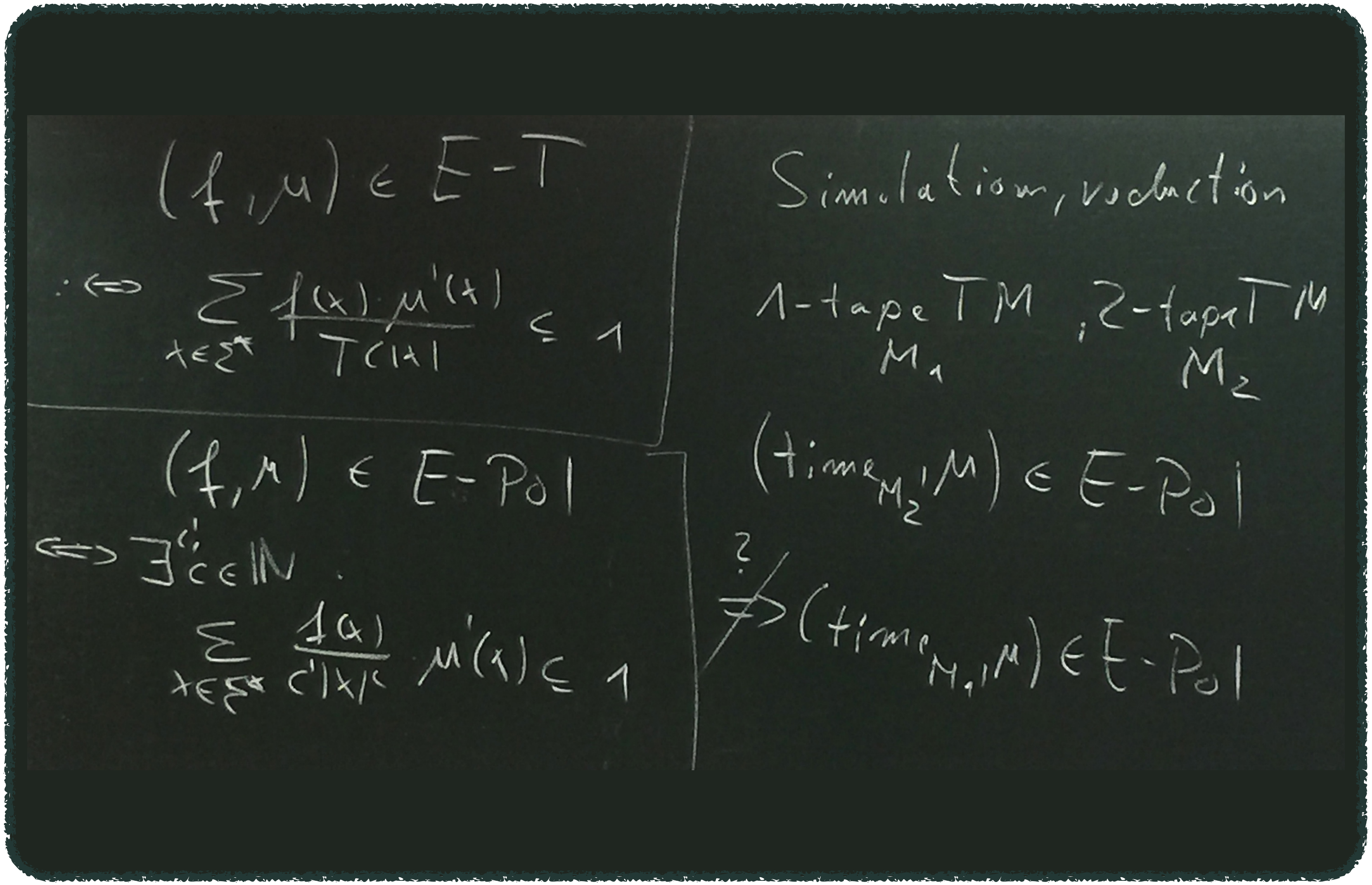
20 Average-P, DisNP



20 Average-P, DisNP



20 Average-P, DisNP



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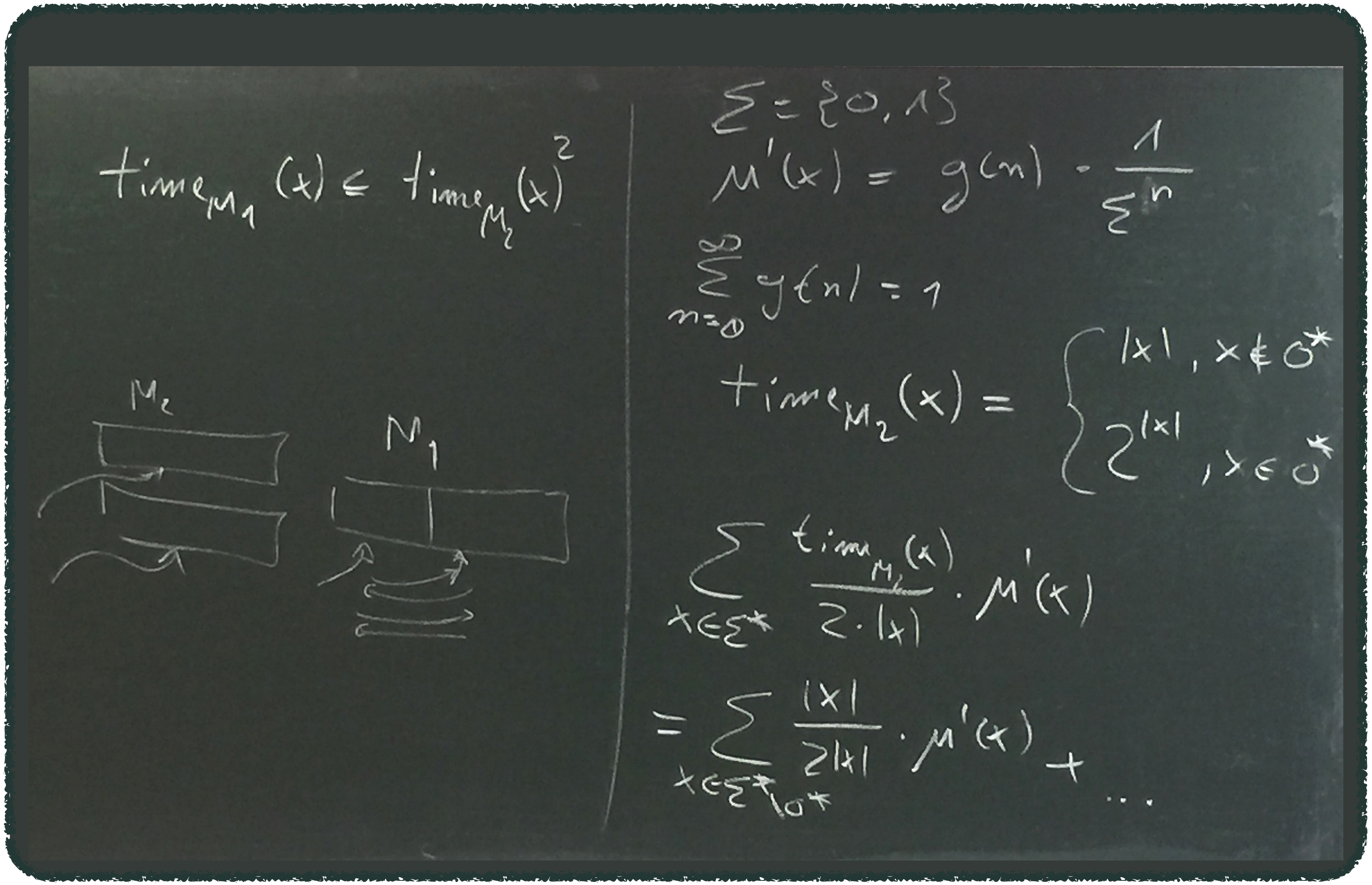
20 Average-P, DisNP



20 Average-P, DisNP

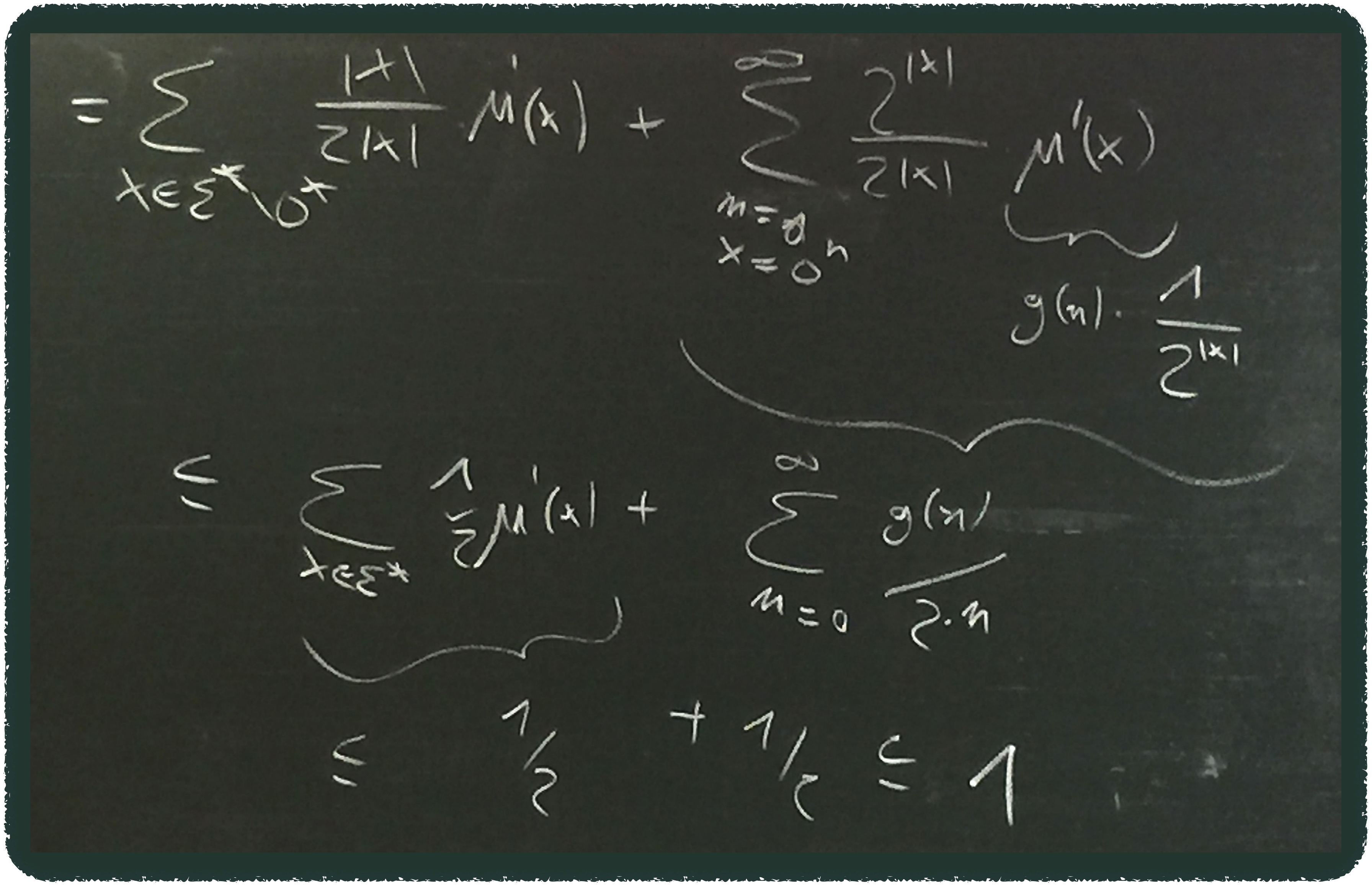
$$\mathrm{time}_{M_1}(x) = \begin{cases} |x|^2 & x \notin 0^* \\ 2^{2\cdot|x|} & x \in 0^* \end{cases}$$

$$\sum_{x\in\Sigma^*} \frac{\mathrm{time}_{M_1}(x)}{c_1|x|^{c_2}} \mu'(x) \geq \underbrace{\sum_{x\in\Sigma^*\setminus 0^*} \frac{|x|^2}{c_1\cdot|x|^{c_2}} \mu'(x)}_{=o(1)} + \sum_{n=0}^{\infty} \frac{2^{2\cdot|x|}}{c_1\cdot|x|^{c_2}} \frac{1}{2^{|x|}} \cdot g(n)$$

$$g(n) = \frac{1}{n^2}\frac{6}{\pi^2} \quad \Big| \quad \sum_{n=1}^{\infty} g(n) = 1$$

$$\geq \sum_{n=0}^{\infty} \underbrace{g(n)}_{\frac{o(1)}{\pi^2}} \cdot \underbrace{\frac{2^{|x|}}{c_1\cdot|x|^{c_2}}}_{\in\,\omega(|x|^c)} \rightarrow \infty$$

20 Average-P, DisNP



20 Average-P, DisNP

$(f,\mu) \in E\text{-}T$

$:\Leftrightarrow \sum_{x\in\Sigma^*} \frac{f(x)\cdot \mu'(x)}{T(|x|)} \le 1$

$(f,\mu) \in Av\text{-}T$

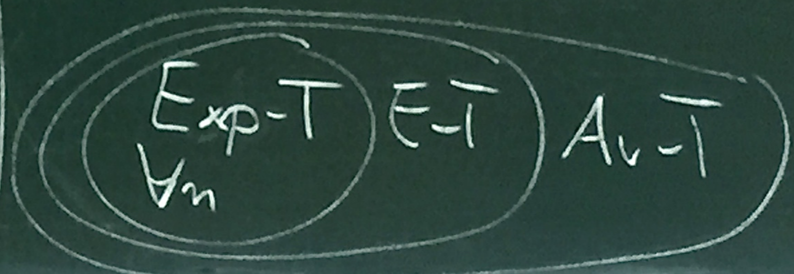
$\Leftrightarrow \sum \frac{T^{-1}(f(x))}{|x|}\, \mu'(x) \le 1$

$(f,\mu) \in E\text{-}Pol$

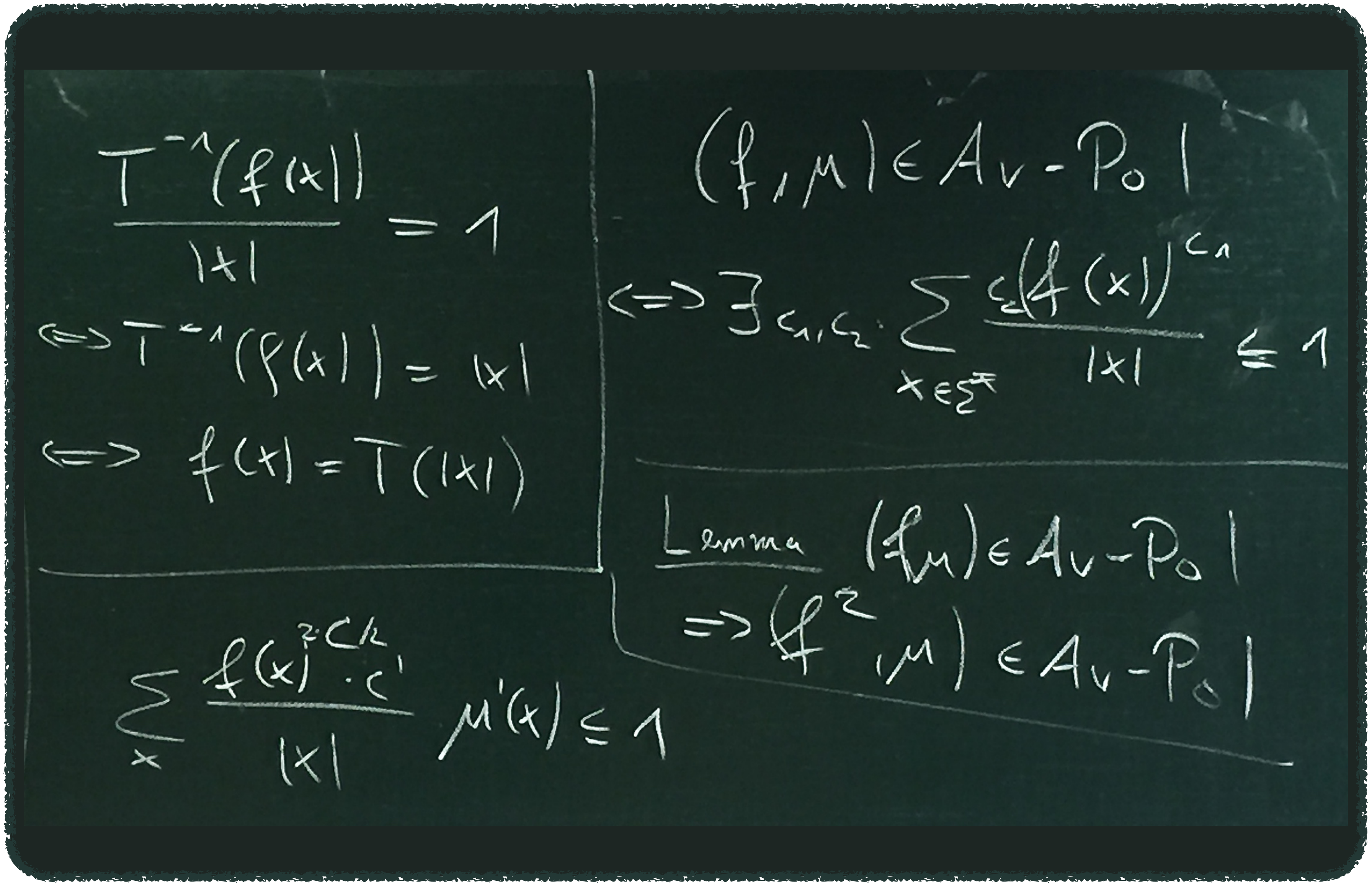
$\Leftrightarrow \exists c, c' \in \mathbb{N}: \sum_{x\in\Sigma^*} \frac{f(x)}{c'|x|^c}\, \mu'(x) \le 1$

if T is monotone

$(f,\mu)\in E\text{-}T \Rightarrow (f,\mu)\in Av\text{-}T$



20 Average-P, DisNP



20 Average-P, DisNP

$\text{Av-P} := \{(L,\mu) \mid \exists \text{ DTM } M,\ (time_M, \mu) \in \text{Av-Pol}\}$

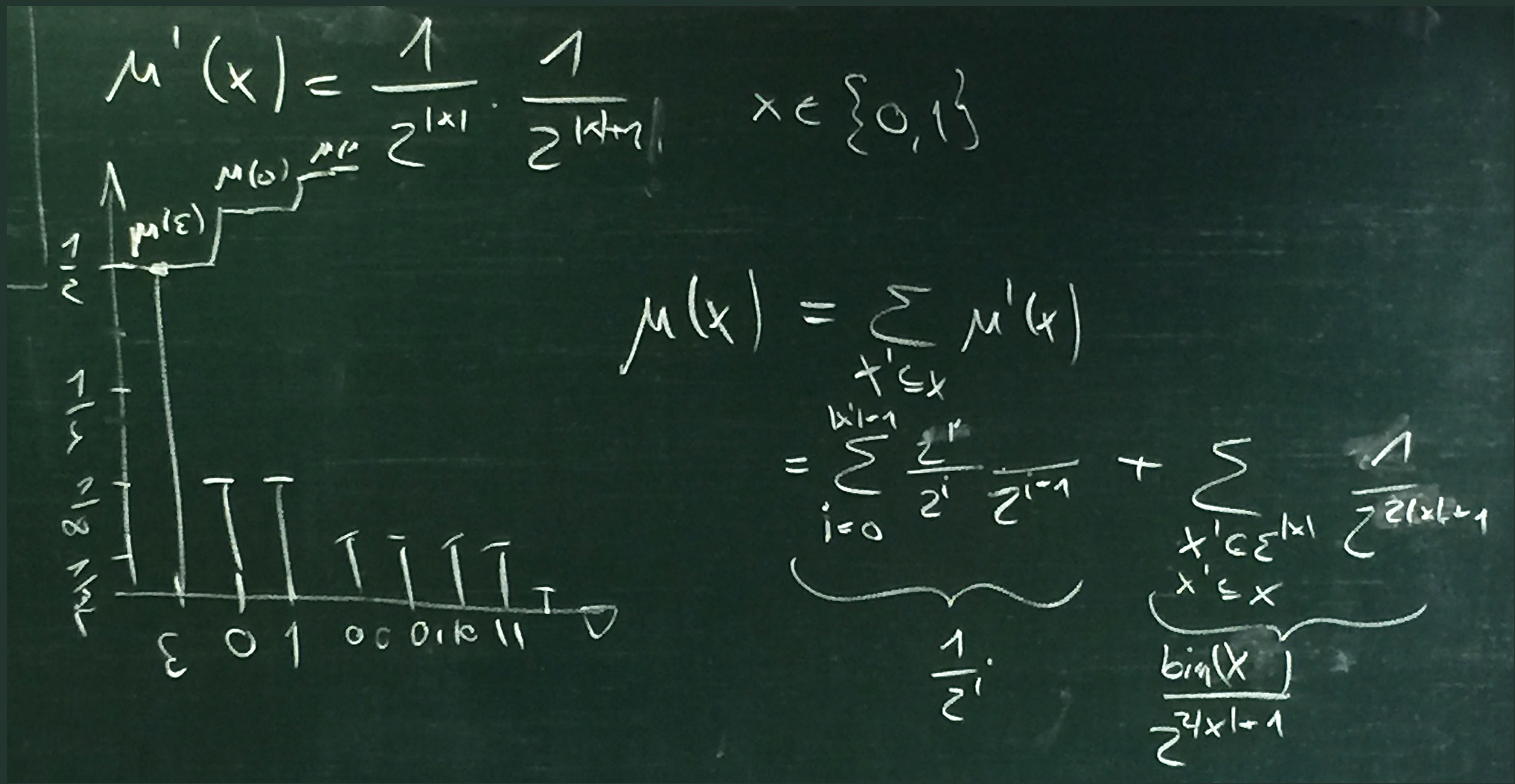
Def $\mu \in$ POL-computable

- $\exists$ DTM M, with input x, 1^m
- M outputs $\mu(x)$ up to m digits
- M is pol time bounded in $|x|+m$

Def $\mu \in$ POL-Samplable

- $\exists$ PTM with no input
- outputs x in time $\leq |x|^c$
- with prob. $\mu'(x)$

20 Average-P, DisNP



20 Average-P, DisNP

$\text{SAT} \in NP\text{-}C$

$\text{SAT} \in P \Rightarrow P = NP$

$(RT, \mu_0) \in \text{Dis}NP\text{-}C$

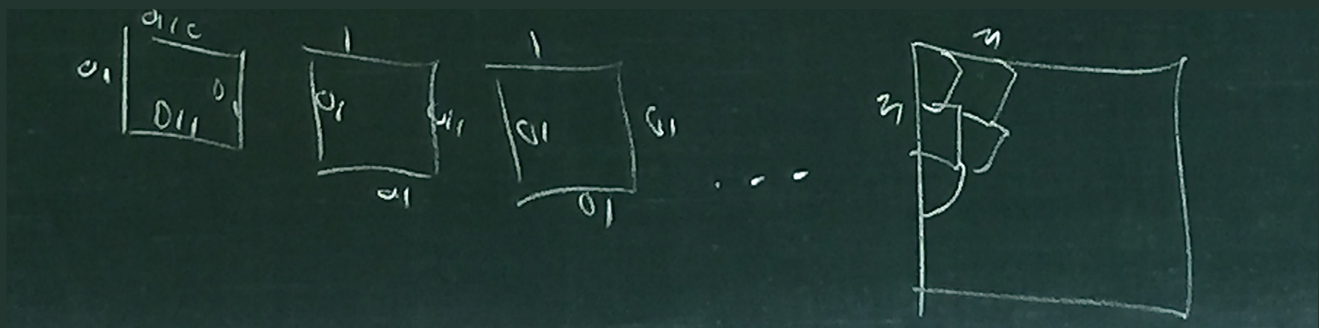
$(RT, \mu_{unif}) \in \text{Av-}P \Rightarrow \text{Dis}NP \subseteq \text{Av-}P$

natural

$\overset{\cdot\cdot}{\|}$

$NP \times POL$-computable

samplable



20 Average-P, DisNP