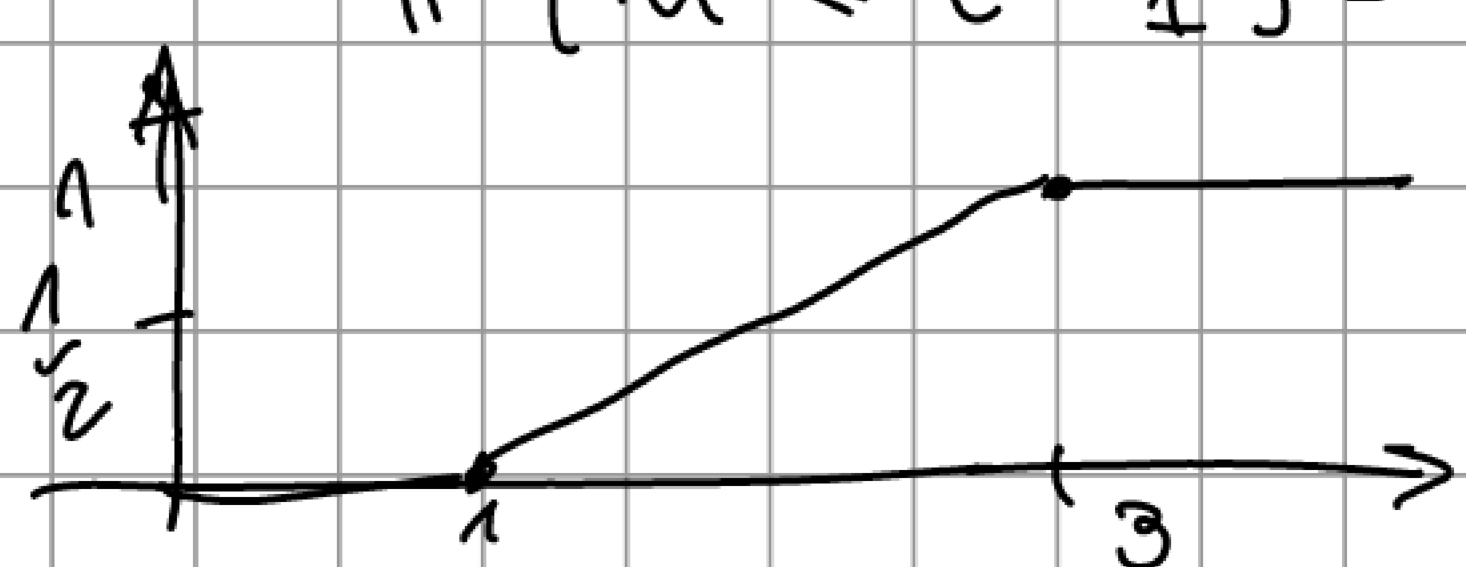
$U \sim \mathcal{U}([0,2])$. $\mu_U(B) = \frac{1}{2}\lambda(B \cap [0,2])$,

$$F_U(t) = \begin{cases} 0 & t < 0 \\ \frac{t}{2} & t < 2 \\ 1 & t \geq 2 \end{cases}$$

1° $Y = U + 1$. $F_Y(t) = \mathbb{P}[Y \leq t] =$

$= \mathbb{P}[U + 1 \leq t] = \mathbb{P}[\{\omega : U(\omega) + 1 \leq t\}] =$

$= \mathbb{P}[U \leq t - 1] = F_U(t-1) = \begin{cases} 0 & t < 1 \\ \frac{t-1}{2} & t < 3 \\ 1 & t \geq 3 \end{cases}$



$\mu_Y(B) = \mathbb{P}[Y \in B] = \mathbb{P}[U \in B - 1] =$

$= \mu_U(B - 1) = \frac{1}{2}\lambda((B-1) \cap [0,2]) =$

$= \frac{1}{2}\lambda(B \cap [1,3])$.

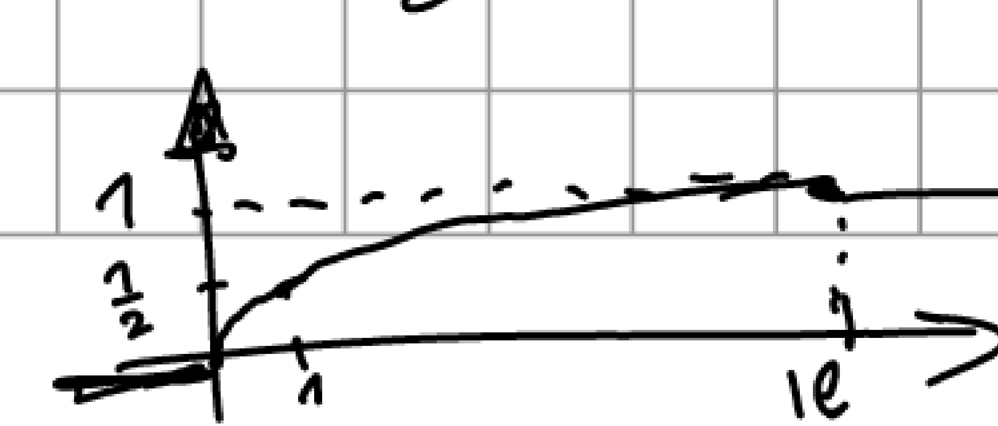
2° $Y = U^4$. $F_Y(t) = \mathbb{P}[Y \leq t] = \mathbb{P}[U^4 \leq t] =$

$= \mathbb{P}[U \leq \sqrt[4]{t}] = F_U(\sqrt[4]{t}) = \begin{cases} 0 & t < 0 \\ \frac{\sqrt[4]{t}}{2} & t < 16 \\ 1 & t \geq 16 \end{cases}$

$\mu_Y(B) = \mathbb{P}[U^4 \in B] =$

$= \mathbb{P}[U \in \sqrt[4]{B}] = \mu_U(\sqrt[4]{B'}) = \frac{1}{2}\lambda(\sqrt[4]{B'} \cap [0,2])$

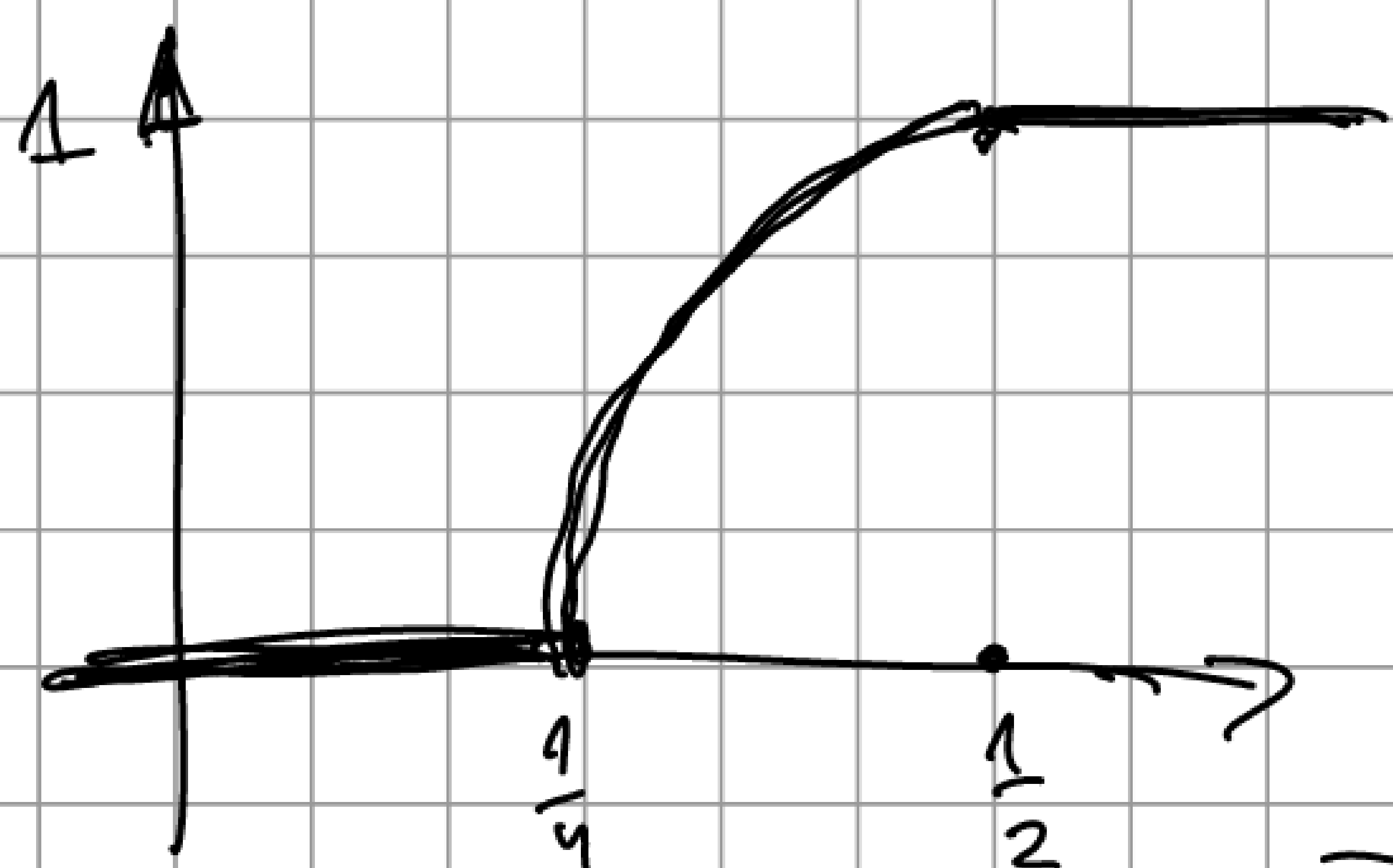
$\sqrt[4]{B} = \{\sqrt[4]{b} : b \in B, b \geq 0\}$



3° $\psi = \frac{1}{u+2}$, $\quad F_\psi(t) = \mathbb{P}\left[\frac{1}{u+2} \le t\right] =$

$= \mathbb{P}\left[u \geq \frac{1}{t} - 2\right] = 1 - \mathbb{P}\left[u \leq \frac{1}{t} - 2\right] =$

$$= 1 - F_u\left(\tfrac{1}{t} - 2\right) = \begin{cases} 0 & t < \frac{1}{4} \\ 2 - \frac{1}{2t} & t < \frac{1}{2} \\ 1 & t \geq \frac{1}{2} \end{cases}$$



$\mu_\psi(B) = \mathbb{P}\left[\frac{1}{u+2} \in B\right] =$

$= \mathbb{P}\left[u \in \frac{1}{B} - 2\right] =$

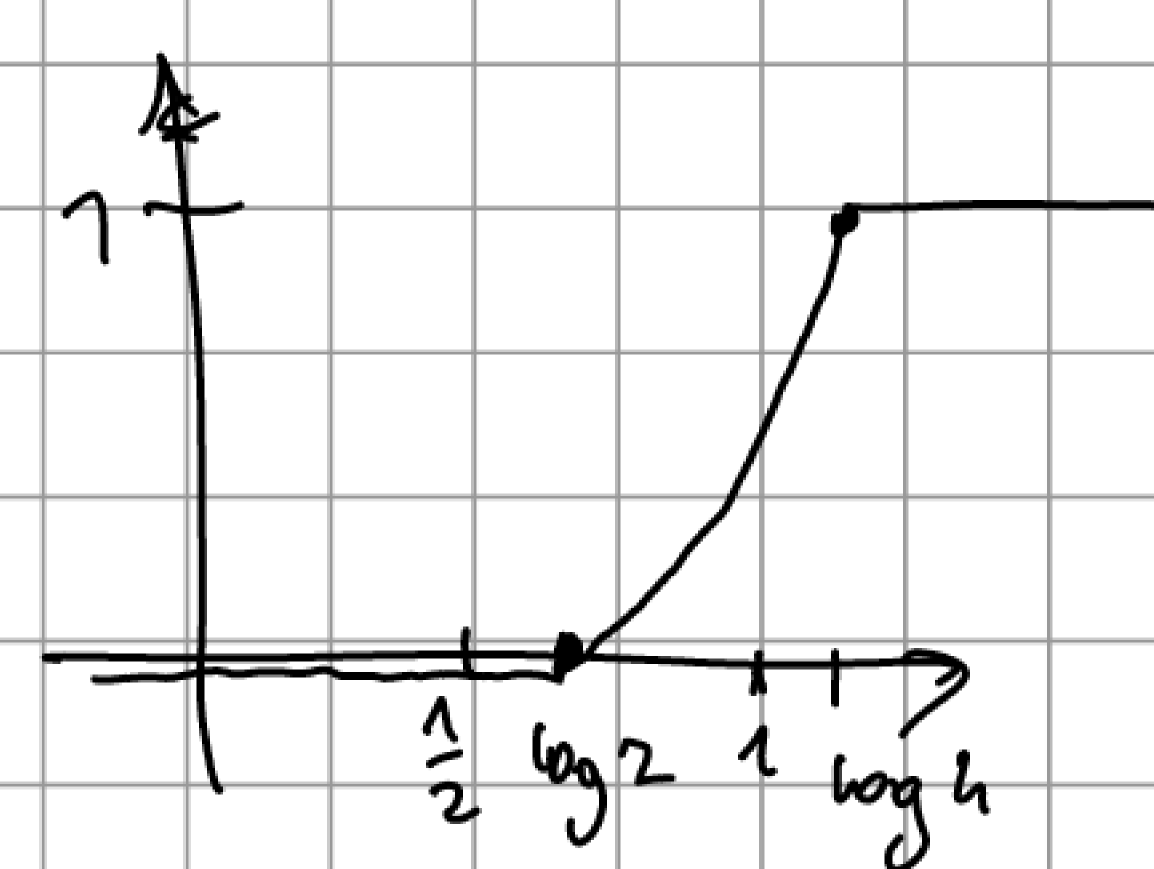
$= \lambda\left(\frac{1}{B} \cap [2,4]\right)$

$\frac{1}{B} = \left\{\frac{1}{b} : b \neq 0, b \in B\right\}$

4° $\psi = \log(u+2)$, $\quad F_\psi(t) = \mathbb{P}[\log(u+2) \le t] =$

$= \mathbb{P}[u \leq e^t - 2] = F_u(e^t - 2) =$

$$= \begin{cases} 0 & t < \log 2 \\ \frac{e^t - 2}{2} & t < \log 4 \\ 1 & t \geq \log 4 \end{cases}$$



$\mu_\psi(B) = \mathbb{P}[\log(u+2) \in B] =$

$= \mathbb{P}[u \in e^B - 2] = \lambda(e^B \cap [2,4])$

$e^B - 2 = \{e^b - 2 : b \in B\}$

5° $Y = |U - 1|$ $\quad F_Y(t) = \mathbb{P}[|U-1| \leq t] =$

$= \mathbb{P}[\{\omega : |U(\omega) - 1| \leq t\}] =$

$= \mathbb{P}[\{\omega : U(\omega) \geq 1 \,,\, U(\omega) \leq t + 1\}] +$

$+ \mathbb{P}[\{\omega : U(\omega) < 1 \,,\, 1 - t \leq U(\omega)\}] =$

$= \mathbb{P}[(U \geq 1) \cap (U \leq t+1)] +$

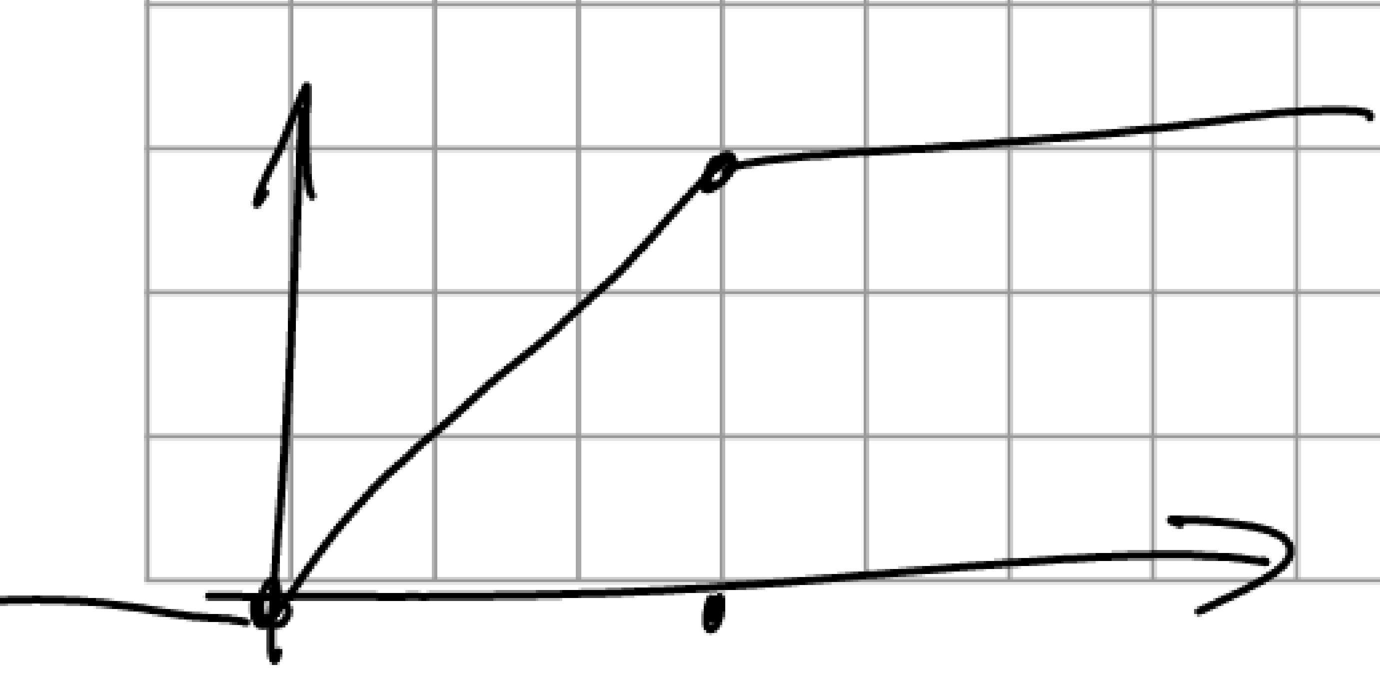
$+ \mathbb{P}[(U < 1) \cap (U \geq 1 - t)] =$

$= \mathbb{P}[U \in [1, t+1]] +$

$+ \mathbb{P}[U \in [1-t, 1]] = \mu_U([1, t+1]) +$

$+ \mu_U([1-t, 1]) = \mu_U([1-t, 1+t]) =$

$$= \frac{1}{2}\lambda\left([1-t, 1+t] \cap [0,2]\right) = \begin{cases} 0 & t < 0 \\ t & t < 1 \\ 1 & t \geq 1 \end{cases}$$



$$\mu_Y(B) = \mathbb{P}[|U-1| \in B] =$$

$$= \mathbb{P}[(U \geq 1) \cap (U-1 \in B)] +$$

$$+ \mathbb{P}[(U < 1) \cap (U \in 1-B)] =$$

$$= \mathbb{P}[U \in B \cap [1,\infty]] +$$

$$+ \mathbb{P}[U \in (1-B) \cap [-\infty, 1]] =$$

$$= \mu_U(B \cap [1,\infty]) + \mu_U((1-B) \cap [-\infty, 1]) =$$

$$= \frac{1}{2}\lambda(B \cap [1,2]) + \frac{1}{2}\lambda((1-B) \cap [0,1]) =$$

$$= \frac{1}{2}\lambda(B \cap [1,2]) + \frac{1}{2}\lambda(B \cap [0,1])$$

$$= \frac{1}{2}\lambda(B \cap [0,2])$$