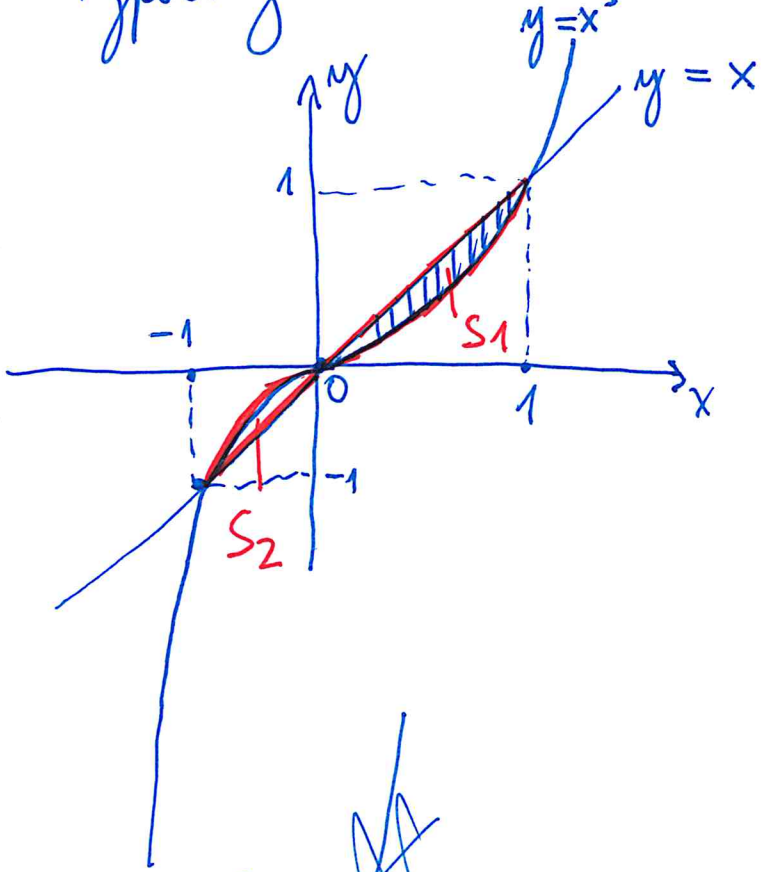
Vypočítejte obsah, ohraničený grafy $y = x^3$ a $y = x$



$S_1 = S_2$

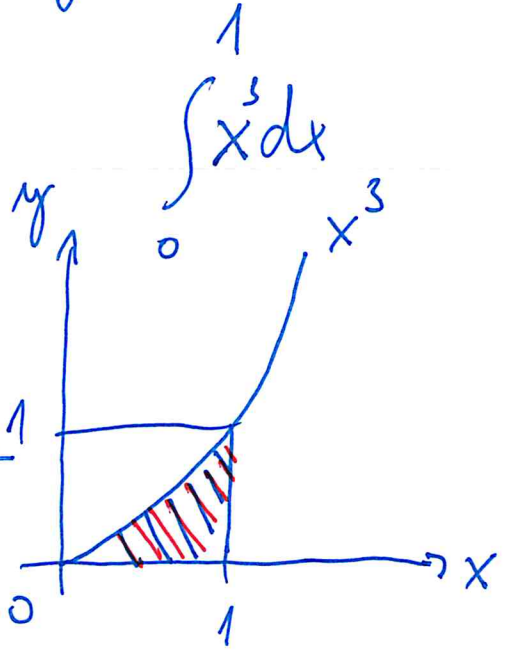
$x^3 = x$

pro $x \neq 0$

$x^2 = 1$

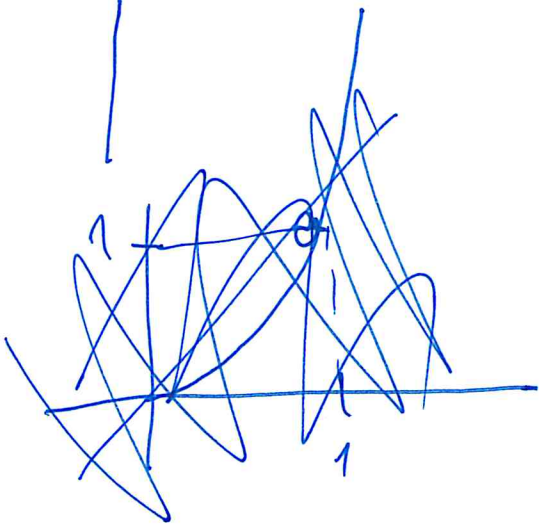
$S = S_1 + S_2 = 2S_1 = 2 \cdot \frac{1}{4} = \frac{1}{2}$

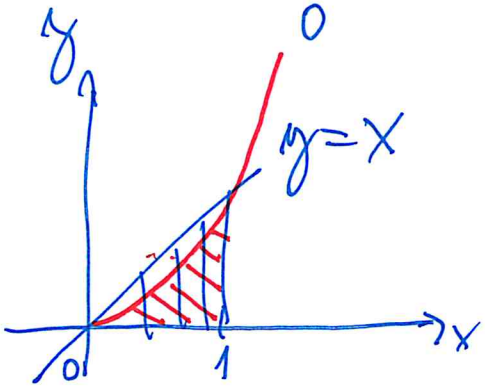
$S_1 = \frac{1}{2} \triangle - \triangle$



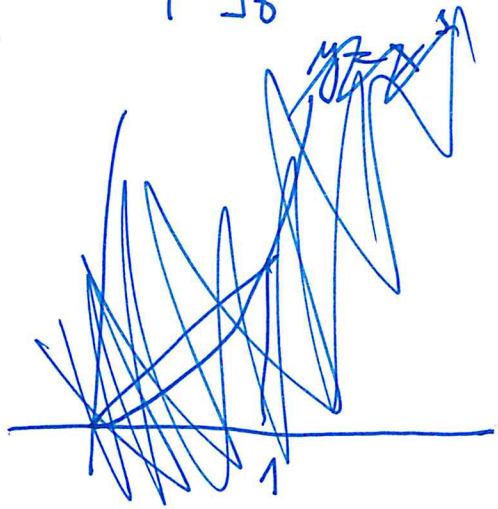
$\int_0^1 x^3 dx$

$S_1 = \int_0^1 (x - x^3)\,dx = \left[\frac{x^2}{2} - \frac{x^4}{4}\right]_0^1 = \frac{1}{2} - \frac{1}{4} = \frac{1}{4}$

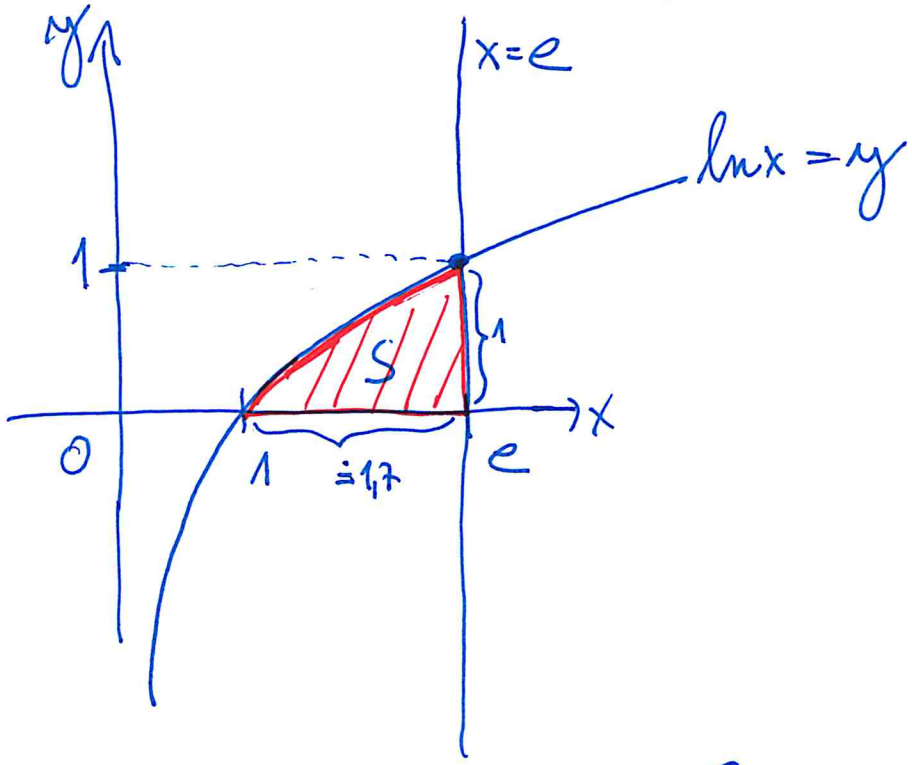




$\int_0^1 x\,dx$



Obsah ohraničený $y = \ln x$, $x = e$, $y = 0$



$$S = \int_1^e \ln x \, dx$$

$$\int_1^e 1 \cdot \ln x \, dx = \left[x \overset{=e}{\ln x}\right]_1^e - \int_1^e 1 \, dx = e - [x]_1^e = e - (e-1) = \underline{\underline{1}}$$

$u = \ln x \qquad u' = \frac{1}{x}$

$v' = 1 \qquad v = x$

Lineární algebra

$$\begin{aligned} x + y &= 2 \\ x - 2y &= -1 \end{aligned} \quad \Leftrightarrow \quad \left[\begin{array}{cc|c} 1 & 1 & 2 \\ 1 & -2 & -1 \end{array}\right]$$

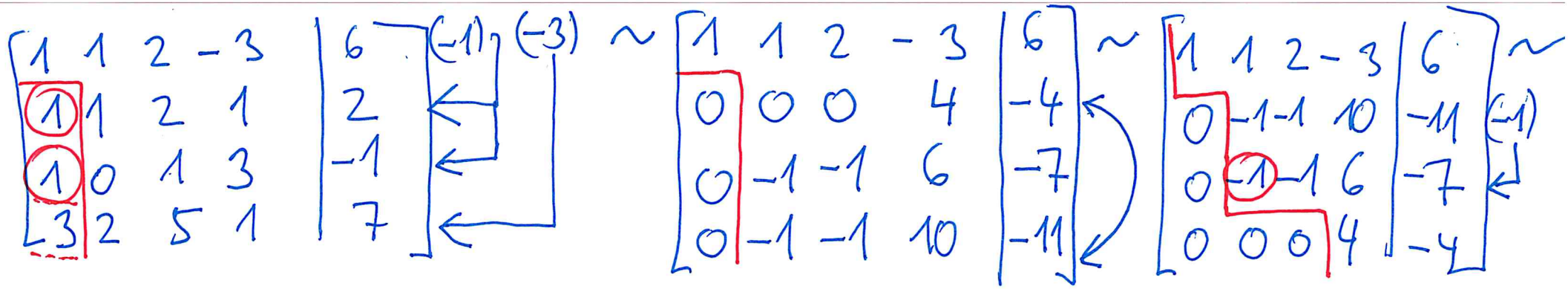
1) výměna řádků
2) vynásobení řádku konstantou ($\neq 0$)
3) přičtení násobku řádku k jiném řádku.
4) škrtnutí nulového řádku

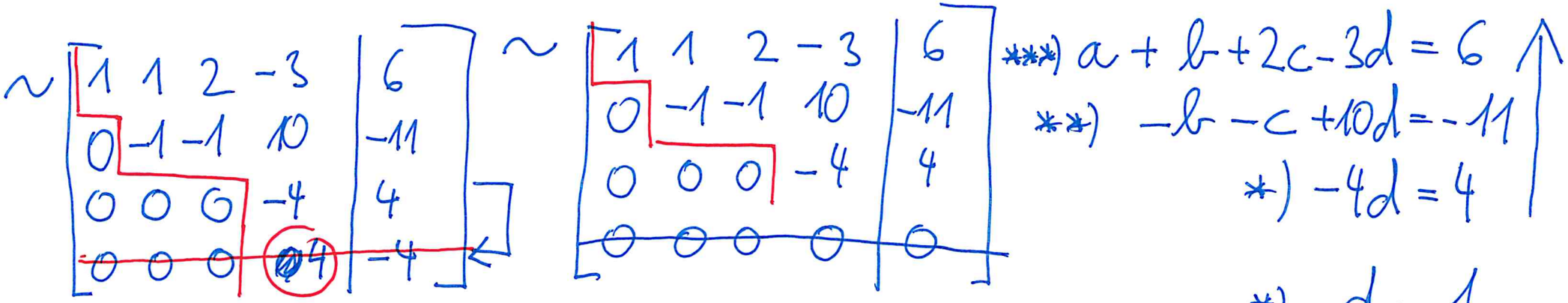
$$\left[\begin{array}{ccc|c} 1 & 3 & 1 & 3 \\ 1 & 0 & 2 & 5 \\ 2 & 2 & 2 & 6 \end{array}\right] \begin{matrix} \\ (-1) \\ (-2) \end{matrix} \sim \left[\begin{array}{ccc|c} 1 & 3 & 1 & 3 \\ 0 & -3 & 1 & 2 \\ 0 & -4 & 0 & 0 \end{array}\right] \begin{matrix} \\ (-4) \\ 3 \end{matrix} \sim \left[\begin{array}{ccc|c} 1 & 3 & 1 & 3 \\ 0 & -3 & 1 & 2 \\ 0 & 0 & -4 & -8 \end{array}\right]$$

$$\begin{aligned} x + 3y + z &= 3 \\ x \qquad\quad 2z &= 5 \\ 2x + 2y + 2z &= 6 \end{aligned}$$

$$\begin{aligned} x + 3y + z &= 3 \\ -3y + z &= 2 \\ -4z &= -8 \end{aligned}$$

$$\begin{aligned} x &= 1 \\ y &= 0 \\ z &= 2 \end{aligned}$$





$$\begin{cases} a = 2 - t \\ b = 1 - t \\ c = t \\ d = -1 \end{cases} \quad t \in \mathbb{R}$$

např. $t = 0$ $\quad a = 2,\ b = 1,\ c = 0,\ d = -1$

***) $a + b + 2c - 3d = 6$

**) $-b - c + 10d = -11$

*) $-4d = 4$

*) $\underline{d = -1}$

**) $-b - c - 10 = -11$

$-b - c = -1$

$c = t \ (t \in \mathbb{R})$

$b = 1 - t$

***) $a = 6 - (1 - t) - 2t - 3$

$a = 2 - t$

$$\left[\begin{array}{cccc|c} 0 & 2 & 4 & -6 & 2 \\ 3 & 6 & -3 & 0 & 0 \\ 1 & 3 & 1 & 3 & 1 \\ -2 & -5 & 0 & -3 & -1 \end{array}\right] \sim \left[\begin{array}{cccc|c} 1 & 3 & 1 & 3 & 1 \\ 3 & 6 & -3 & 0 & 0 \\ 0 & 2 & 4 & -6 & 2 \\ -2 & -5 & 0 & -3 & -1 \end{array}\right] \begin{matrix} \\ (-3) \\ \\ (2) \end{matrix} \sim \left[\begin{array}{cccc|c} 1 & 3 & 1 & 3 & 1 \\ 0 & -3 & -6 & -9 & -3 \\ 0 & 2 & 4 & -6 & 2 \\ 0 & 1 & 2 & 3 & 1 \end{array}\right] \begin{matrix} \sim \\ 2 \\ 3 \\ 3 \end{matrix} \begin{matrix} \\ \\ \\ 1 \end{matrix}$$

$$\sim \left[\begin{array}{cccc|c} 1 & 3 & 1 & 3 & 1 \\ 0 & -3 & -6 & -9 & -3 \\ 0 & 0 & 0 & -36 & 0 \\ 0 & 0 & 0 & 0 & 0 \end{array}\right] \begin{matrix} \\ :(-3) \\ \\ \end{matrix}$$

$a + 3b + c + 3d = 1 \rightarrow a = 1 - 3(1-2t) - t = -2 + 5t$

$b + 2c + 3d = 1 \rightarrow c = t \ (t \in \mathbb{R}), \ b = 1 - 2t$

$-36d = 0 \rightarrow d = 0$