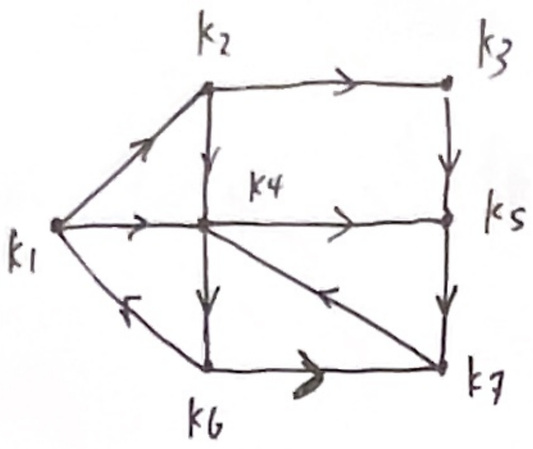
Aufgabe 2



这是一个 Graph

a. 求 Anzahl der Knoten k & der Zweige z

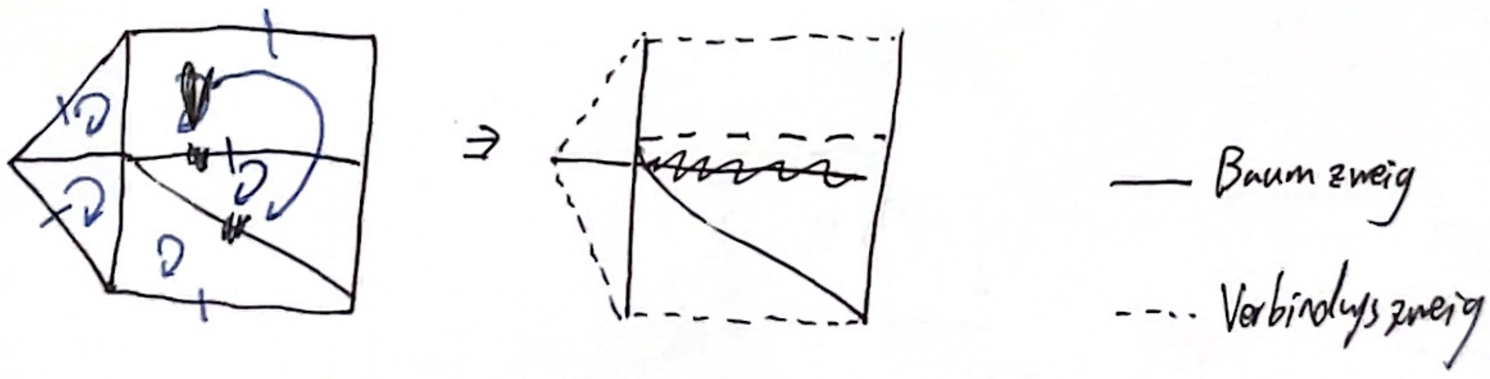
k = 7, z = 11

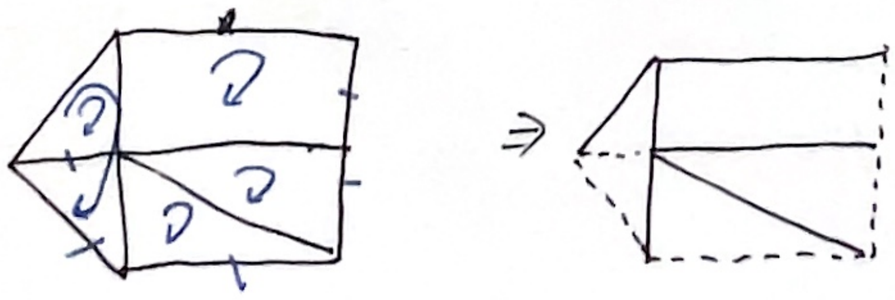
b. 确定 linear unabhängige Maschengleichyn & Knotagleichyen 的数量

m = z - k + 1 = 11 - 7 + 1 = 5

p = k - 1 = 6

c. 选择两个 Bäume 并画出各自的 Fundamentalmasche





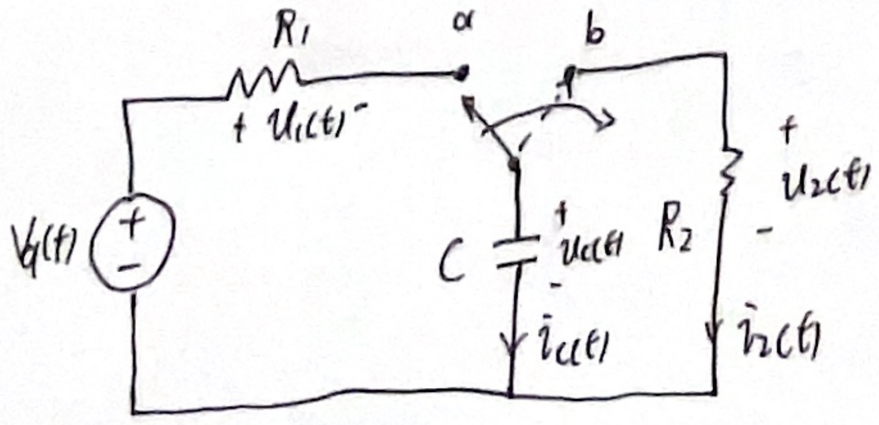
Aufgabe 3

给定一个 Netzwerkmodell, 由两个 linear, zeitinvariant 的电阻, $R > 0$, $R_1 > 1$,

一个 linear, zeitinvariant 电容 $C > 0$, 一个 fest Spannungsquelle $u_q(t) = V_0 = const$ 组成.

当 $t = 0$ 时, 开关 从 a → b

假设 $t < 0$ 时, Netzwerk eingeschwungen, $u_c(0^-) = u_c(0) = u_c(0^+)$

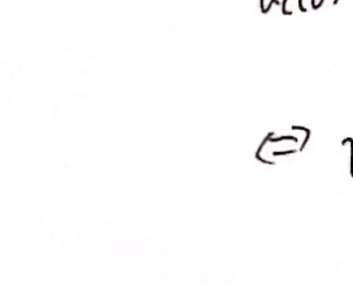


a. 求 $u_c(t)$, $t<0$

eingeschwungen, $i(t) = i_c(t) = C\frac{du_c(t)}{dt} = 0$, da $u_c(t) = const$

电容 ≙ Leerlauf $\Rightarrow u_c(t) = V_0$

b. 求 $u_c(t)$, $t>0$



KCL: $i_c(t) = -i_2(t)$

KVL: $u_c(t) = u_2(t)$

$\Rightarrow u_c(t) = i_2(t) \cdot R_2 = -i_c(t) R_2 = -R_2 C \frac{du_c(t)}{dt}$

$\Leftrightarrow \frac{1}{u_c(t)} du_c(t) = -\frac{1}{R_2 C} dt$

$$\int_{u_c(0)}^{u_c(t)} \frac{1}{u_c(t)} du_c(t) = -\frac{1}{R_2 C}\int_0^t dt \Leftrightarrow \left|\ln\left|\frac{u_c(t)}{u_c(0)}\right|\right| = -\frac{1}{R_2 C} t$$

$\Leftrightarrow u_c(t) = u_c(0) e^{-\frac{1}{R_2 C} t} = V_0 e^{-\frac{1}{R_2 C} t}$

因为 $u_c(0^-)$ 时, $u_c(0^-) = V_0 = u_c(0) = u_c(0^+)$