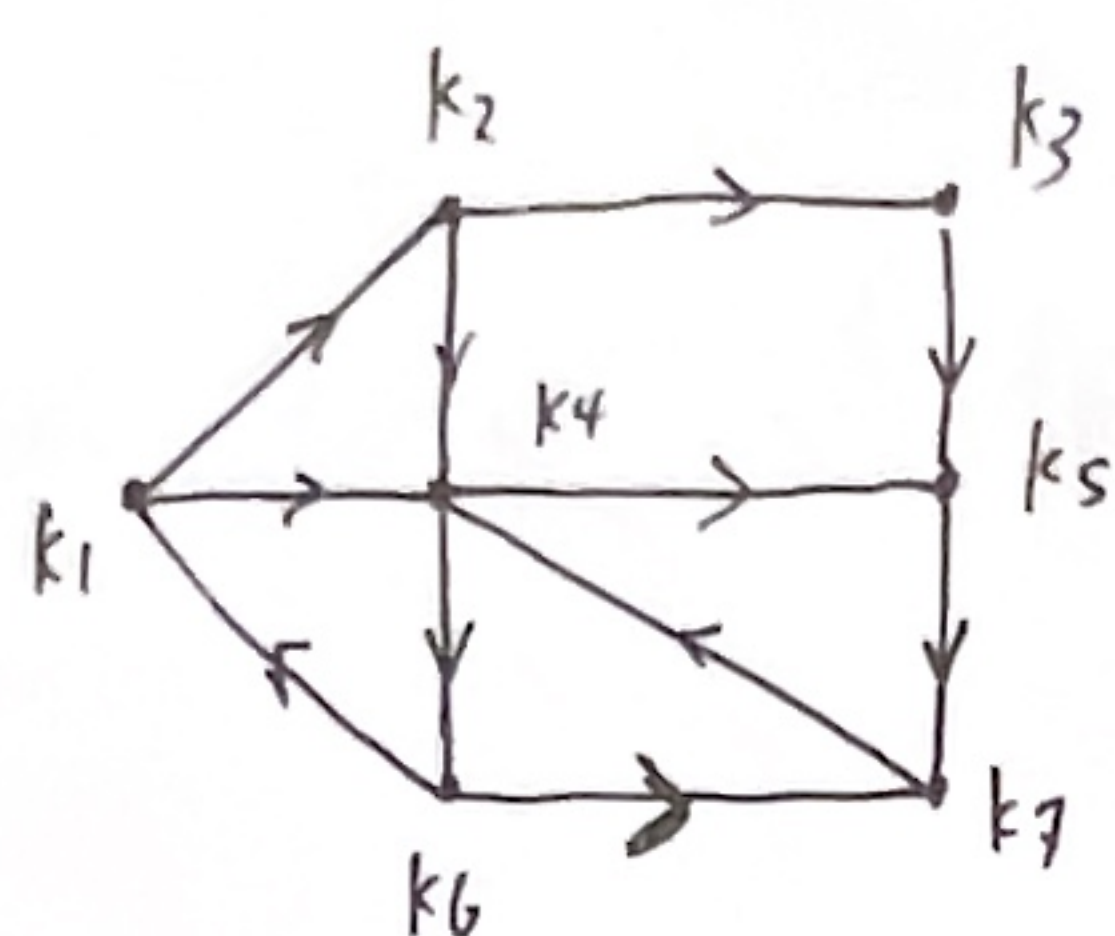


## Aufgabe 2



这是一个 Graph

a. 求 Anzahl der Knoten  $k$  & der Zweige  $z$

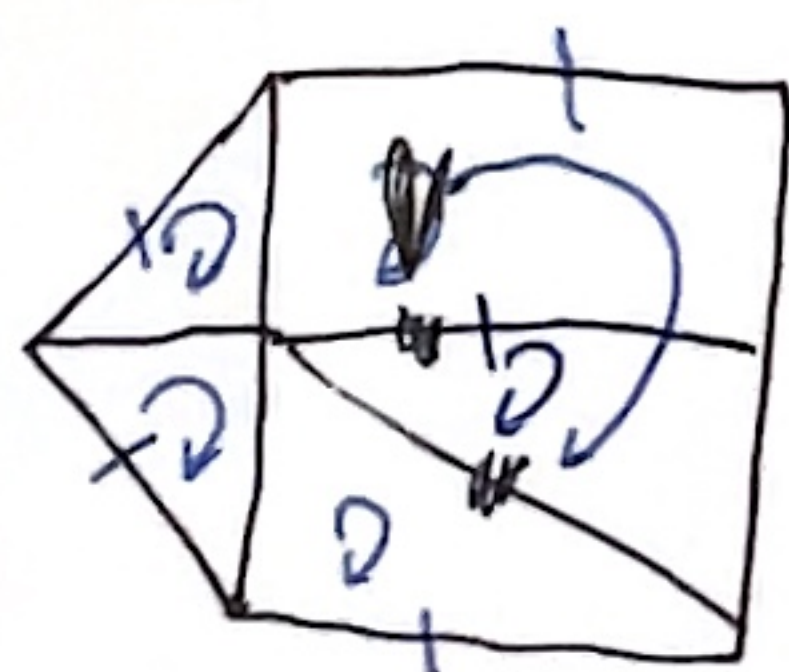
$$k = 7, z = 11$$

b. 求定 linear unabhängige Maschengleichungen & Knotengleichungen 的数量

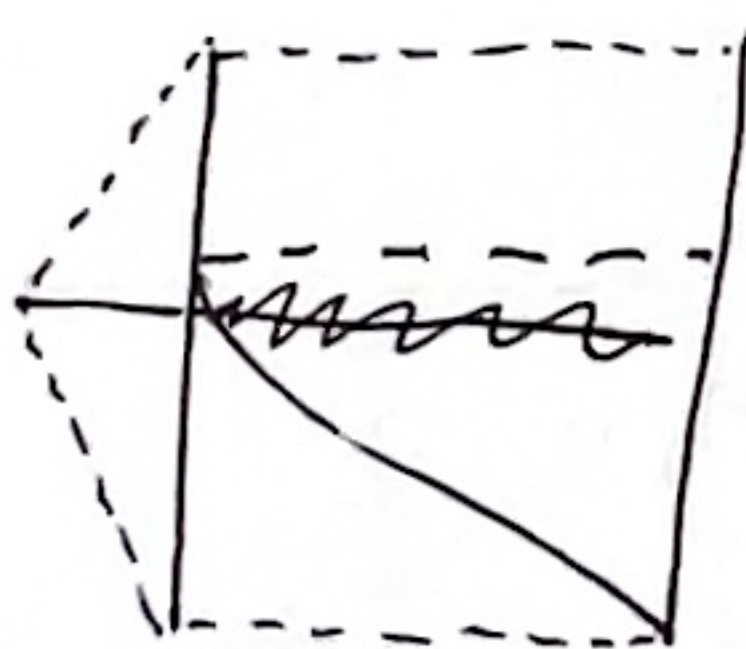
$$m = z - k + 1 = 11 - 7 + 1 = 5$$

$$p = k - 1 = 6$$

c. 选择两个 Bäume 并圈出各自的 Fundamentalmasche

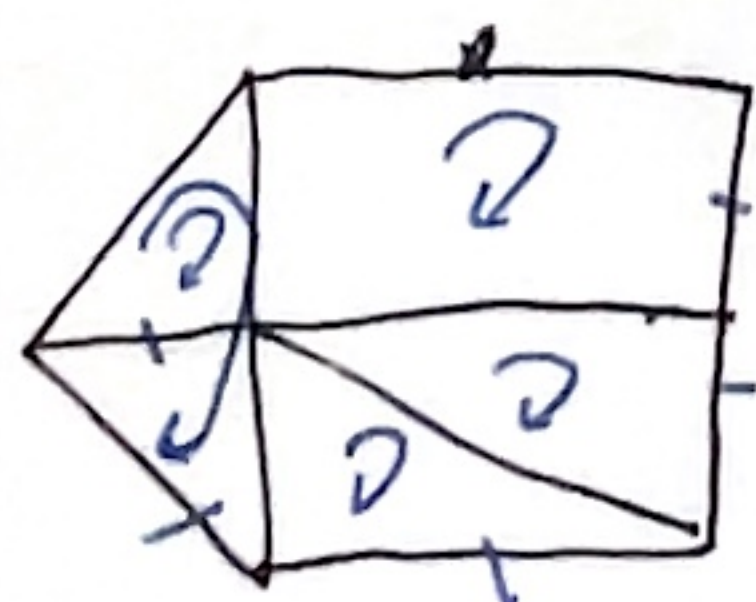


$\Rightarrow$

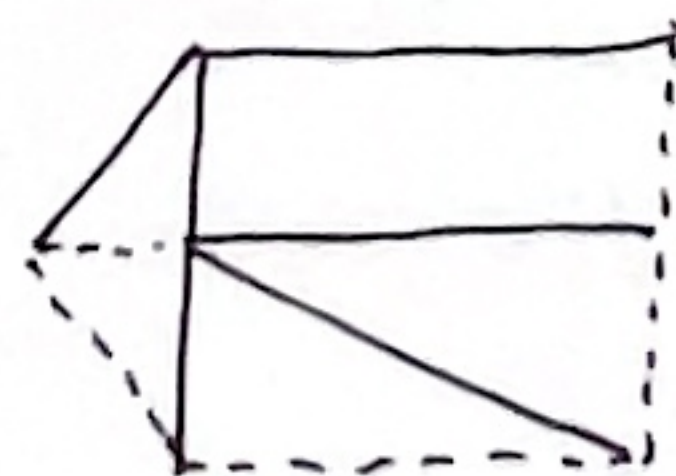


— Baumzweig

--- Verbindungs-zweig



$\Rightarrow$



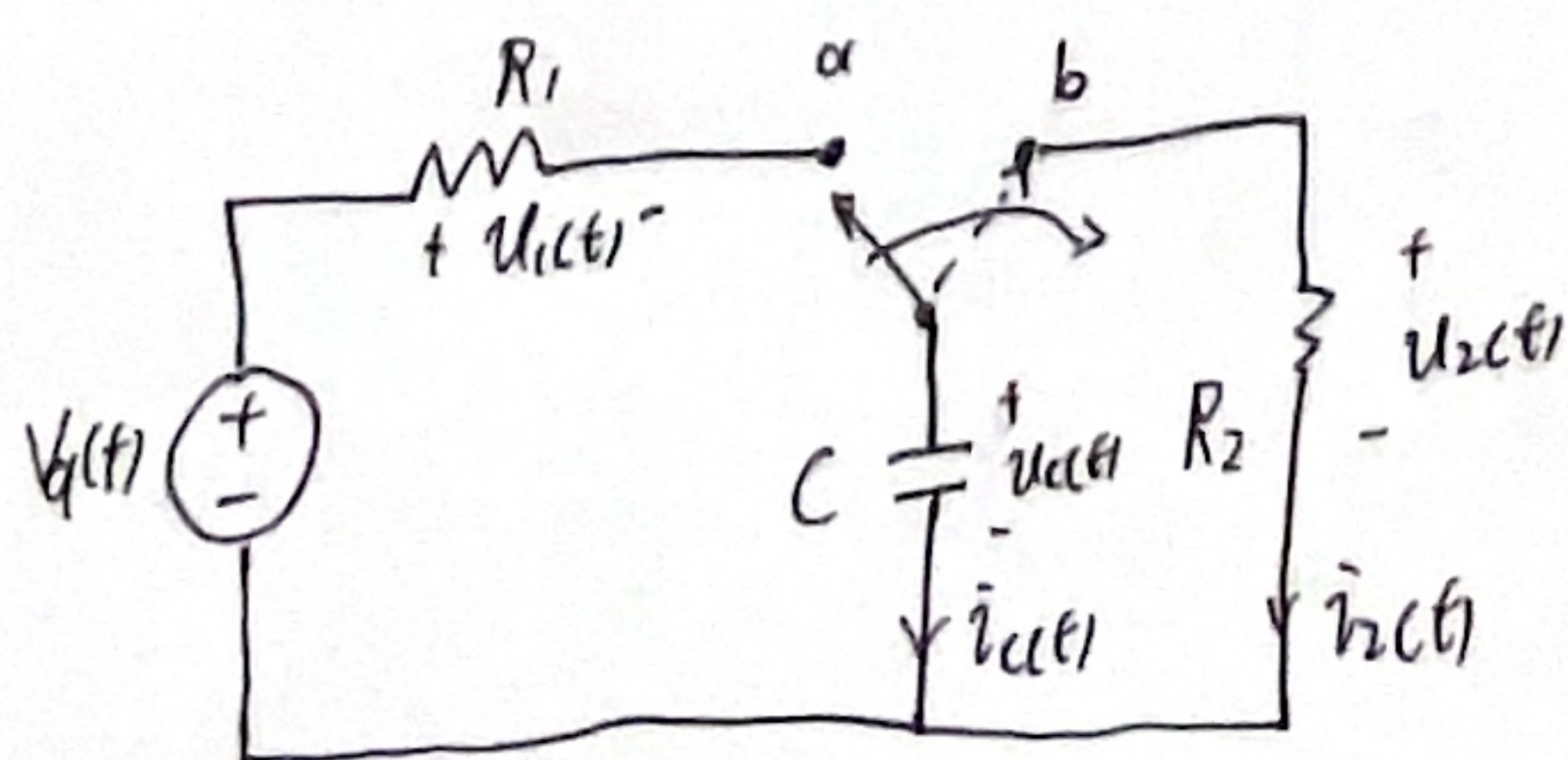
## Aufgabe 3

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 feste Spannungsquelle  $U_q(t) = V_0 = \text{const}$  且

当  $t=0$  时, 开关从  $a \rightarrow b$

假设当  $t < 0$  时, Netzwerk eingeschlossen,  $U_C(0^-) = U_C(0) = U_C(0^+)$



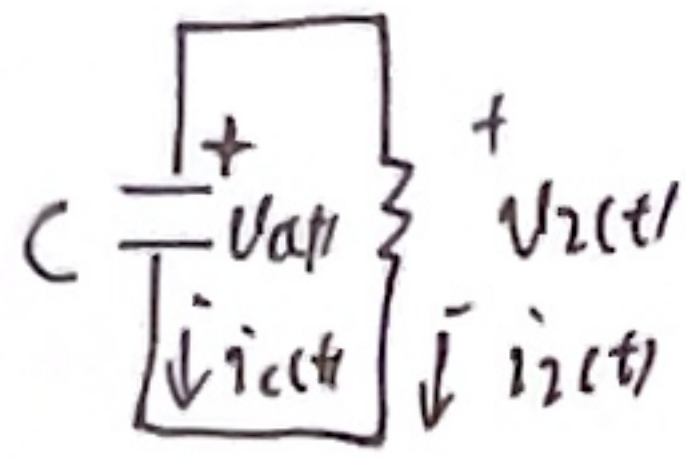


a. f.  $u_c(t)$ ,  $t < 0$

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

Leert  $\hat{=}$  Leerlauf  $\Rightarrow u_c(t) = V_0$

b. f.  $u_c(t)$ ,  $t > 0$



~~$$u_c(t) = u_2(t) = i_c(t) R_2 = R_2 C \frac{du_c(t)}{dt}$$~~

$$\text{KCL: } i_c(t) = -i_2(t)$$

$$\text{KVL: } u_c(t) = u_2(t)$$

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

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

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

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

(bei  $u_c(0)$  ist,  $u_c(0) = V_0 = u_c(0) = u_c(0^+)$ )