

离散数学(2) 第二次作业

7. 同构

理由: 对图(a)(b)各点入度出度讨论

	入度	出度		入度	出度
v_1	2	2	a	1	1
v_2	1	1	b	2	2
v_3	2	2	c	2	2
v_4	3	0	d	1	1
v_5	1	1	e	3	0
v_6	0	3	f	0	3

假设(a)(b)同构, 则双射 $f: \{v_i\} \rightarrow \{w_i\}$ 一定有 (由入度出度)

$$f(v_4) = e \quad f(v_6) = f$$

$$\text{不妨令 } f(v_1) = b \quad f(v_3) = c \quad f(v_2) = a \quad f(v_5) = d$$

(a) 中每条边讨论 $e_1 = (v_1, v_2)$ (b, a)

$$e_2 = (v_1, v_4) \rightarrow (b, e)$$

$$e_3 = (v_2, v_5) \rightarrow (a, d)$$

$$e_4 = (v_3, v_1) \rightarrow (c, b)$$

$$e_5 = (v_3, v_4) \rightarrow (c, e)$$

$$e_6 = (v_5, v_3) \rightarrow (d, c)$$

$$e_7 = (v_6, v_1) \rightarrow (f, b)$$

$$e_8 = (v_6, v_3) \rightarrow (f, c)$$

$$e_9 = (v_6, v_4) \rightarrow (f, e)$$

两图完全同构

8.

邻接矩阵

$$A = \begin{bmatrix} 0 & 1 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 & 1 & 0 \\ 1 & 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 & 0 \\ 1 & 0 & 1 & 1 & 0 & 0 \end{bmatrix}$$

关联矩阵 (边序号如7题过程所示)

$$B = \begin{bmatrix} 1 & 1 & 0 & -1 & 0 & 0 & -1 & 0 & 0 \\ -1 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 & 1 & -1 & 0 & -1 & 0 \\ 0 & -1 & 0 & 0 & -1 & 0 & 0 & 0 & -1 \\ 0 & 0 & -1 & 0 & 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 1 & 1 & 1 \end{bmatrix}$$

$e_1 \ e_2 \ e_3 \ e_4 \ e_5 \ e_6 \ e_7 \ e_8 \ e_9$

边列表

$$A: (1 \ 1 \ 2 \ 3 \ 3 \ 5 \ 6 \ 6 \ 6)$$

$$B: (2 \ 4 \ 5 \ 1 \ 4 \ 3 \ 1 \ 3 \ 4)$$

正向表

