学籍番号									氏名	

学籍番号と氏名は丁寧に記載すること

「離散数学・オートマトン」確認テスト

2024/11/7

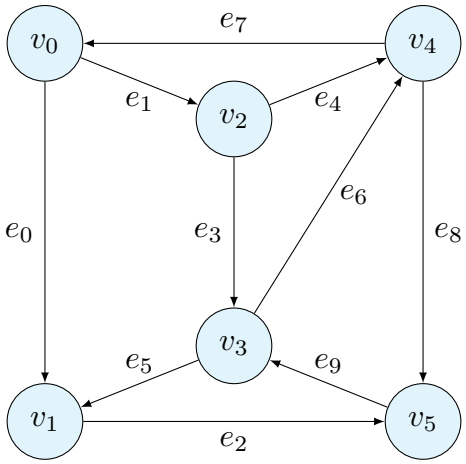
問 1　以下のグラフ $G = (V, E)$ を図示しなさい。

Draw the following graph $G = (V, E)$.

$$V = \{v_0, v_1, v_2, v_3, v_4, v_5\}$$
$$E = \{e_0, e_1, e_2, e_3, e_4, e_5, e_6, e_7, e_8\}$$

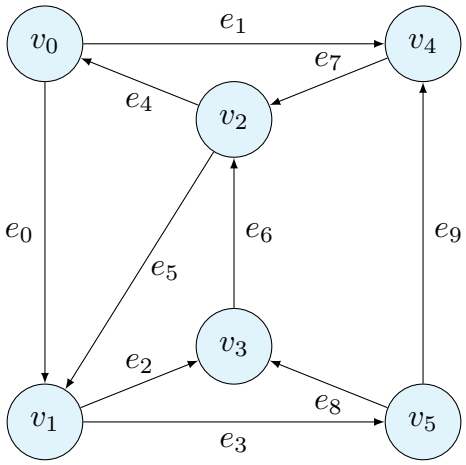
$\partial^+ e_0 = v_0$	$\partial^- e_0 = v_1$	$\partial^+ e_1 = v_0$	$\partial^- e_1 = v_2$
$\partial^+ e_2 = v_1$	$\partial^- e_2 = v_5$	$\partial^+ e_3 = v_2$	$\partial^- e_3 = v_3$
$\partial^+ e_4 = v_2$	$\partial^- e_4 = v_4$	$\partial^+ e_5 = v_3$	$\partial^- e_5 = v_1$
$\partial^+ e_6 = v_3$	$\partial^- e_6 = v_4$	$\partial^+ e_7 = v_4$	$\partial^- e_7 = v_0$
$\partial^+ e_8 = v_4$	$\partial^- e_8 = v_5$	$\partial^+ e_9 = v_5$	$\partial^- e_9 = v_3$

解答例



問 2　以下のグラフを記号で表しなさい。

Show the symbolic representation of the following graph.



解答例　始めに、辺から頂点への写像 $\partial^{\pm}$ を使った表現を示す。

At first, we show the representation using the map $\partial^{\pm}$ from edges to vertices.

$$V = \{v_0, v_1, v_2, v_3, v_4, v_5\}$$
$$E = \{e_0, e_1, e_2, e_3, e_4, e_5, e_6, e_7, e_8, e_9\}$$

$$\begin{array}{llll}
\partial^+ e_0 = v_0 & \partial^- e_0 = v_1 & \partial^+ e_1 = v_0 & \partial^- e_1 = v_4 \\
\partial^+ e_2 = v_1 & \partial^- e_2 = v_3 & \partial^+ e_3 = v_1 & \partial^- e_3 = v_5 \\
\partial^+ e_4 = v_2 & \partial^- e_4 = v_0 & \partial^+ e_5 = v_2 & \partial^- e_5 = v_1 \\
\partial^+ e_6 = v_3 & \partial^- e_6 = v_2 & \partial^+ e_7 = v_4 & \partial^- e_7 = v_2 \\
\partial^+ e_8 = v_5 & \partial^- e_8 = v_3 & \partial^+ e_9 = v_5 & \partial^- e_9 = v_4
\end{array}$$

次に、頂点から辺の集合への写像 $\delta^{\pm}$ を用いた表現を示す。

Next, we show the representation using the map $\delta^{\pm}$ from vertices to sets of edges.

$$\begin{array}{ll}
\delta^+ v_0 = \{e_0, e_1\} & \delta^- v_0 = \{e_4\} \\
\delta^+ v_1 = \{e_2, e_3\} & \delta^- v_1 = \{e_0, e_5\} \\
\delta^+ v_2 = \{e_4, e_5\}, & \delta^- v_2 = \{e_6, e_7\} \\
\delta^+ v_3 = \{e_6\} & \delta^- v_3 = \{e_2, e_8\} \\
\delta^+ v_4 = \{e_7\} & \delta^- v_4 = \{e_1, e_9\} \\
\delta^+ v_5 = \{e_8, e_9\} & \delta^- v_5 = \{e_3\}
\end{array}$$