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A NOTE ON SMALL DIRECTED GRAPHS
AS NEIGHBORHOOD GRAPHS

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Let G be a directed graph, let v be its vertex. By $N_G(v)$, [1] denoted the subgraph of G induced by the set of all terminal vertices of edges of G whose initial vertex is v . The graph $N_G(v)$ will be called the neighborhood graph of v in G .

In [1], \mathcal{H} denotes the class of all digraphs H with the property that there exists a digraph G such that $N_G(v) \simeq H$ for each vertex v of G . [1] studied digraphs which belong to \mathcal{H} and have at most three vertices. In this note we will make some corrections.

In [1], before formulating his theorem Zelinka introduced an auxiliary concept. Let m, n be positive integers. He denoted $V(m, n)$ to be the set of all n -dimensional vectors (v_1, \dots, v_n) where $v_i \in \{0, 1, \dots, m-1\}$ for $i = 1, 2, \dots, n$. If we perform additions or subtractions with coordinates of these vectors, we consider them modulo m .

Zelinka in [1] stated the following theorem and proved it. His proof is very nice and correct, except in some cases it needs correction:

Theorem. *Let H be a directed graph with at most three vertices. Then $H \in \mathcal{H}$ if and only if the number of double edges of H is not 2.*

Comments or Corrections. The proof of this theorem requires the following corrections:

The graph G for H_i will be denoted by G_i for $i = 1, 2, \dots, 14$.

In G_4 the corresponding H_4 should be the following graph (see Fig. 1):

The graph G_7 should be the following graph, corresponding to H_7 (see Fig. 2):

In G_9 the corresponding H_i should be H_{10} and in G_{10} , the corresponding H_i should be H_9 .

The graph G_{11} should be the following corresponding to H_{11} (see Fig. 3):

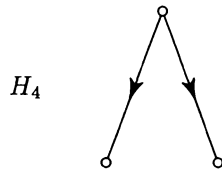


Fig. 1

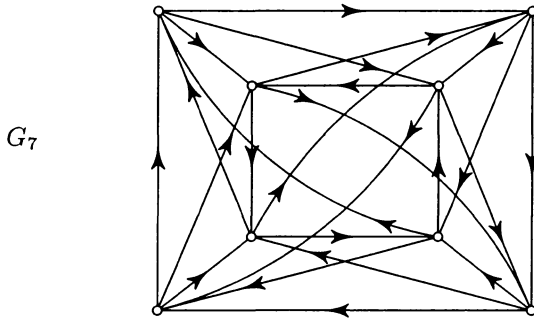


Fig. 2

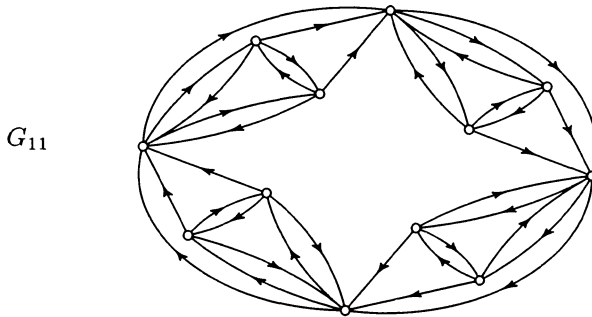


Fig. 3

The graph G_{13} should be a complete directed graph of five vertices; deleting the edges of a directed Hamiltonian cycle.

References

- [1] Zelinka, B.: Small directed graphs as neighborhood graphs. Czech. Math. J. 38 (113) (1988).

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