Chapter 1
Introduction

Let G be a graph with the vertex set $V(G) = \{v_1, v_2, \ldots, v_n\}$ and edge set $E(G) \subseteq \{\{x, y\} \mid x, y \in V(G), x \neq y\}$. The adjacency matrix of the graph G is the $n \times n$ matrix $A(G) = (a_{ij})_{n\times n}$ where

$$a_{ij} = \begin{cases} 1 & \text{if } \{v_i, v_j\} \in E(G), \\ 0 & \text{otherwise.} \end{cases}$$

In 1962, F. Harary [3] found the formula to calculate the determinant of the adjacency matrices of graphs by using the spanning elementary subgraphs of the given graphs.

In 1996, H. M. Rara [4] found a reduction process to calculate the determinant of the adjacency matrices of planar grids.

In 2007, S. Sookyang, Sr. Arworn and P. Wojtylak [6] characterized nonsingular cycles and trees, that is the determinant of their adjacency matrices are not zero.

In 2007, S. Sookyang and Sr. Arworn [5] defined a kind of graphs $P_n(C_m)$ which is so called the path P_n of cycle C_m and find out the determinant of their adjacency matrices.

In 2009, Sr. Arworn and P. Wojtylak [1] studied a special kind of graphs which consists of two graphs with one common vertex. They applied their formula of the determinant of the adjacency matrices of such kind of graphs to the graphs $P_n(C_m)$ and $C_n(C_m)$, the cycle C_n of cycles C_m.

For this thesis, we defined the graphs $P_n(P_m)$ and $C_n(P_m)$ in the similar way as Sr. Arworn and P. Wojtylak [1] did, and studied for the determinant of their adjacency matrices.

This thesis is divided into five chapters. Chapter 1 is an introduction, for the definitions and the recent results which were found before. Chapter 2 deals with some preliminaries and give some useful results that will be used throughout this thesis. Chapter 3 is the main result of this research. We determine the determinant of the adjacency matrices of the graphs $P_n(P_m)$ and $C_n(P_m)$. The conclusion of this research is in Chapter 4. Chapter 5 is some applications and open problems.