SKOLEM DIFFERENCE ODD GEOMETRIC MEAN LABELING OF SOME DISCONNECTED GRAPHS

ABSTRACT

In this paper we investigate the Skolem Difference odd Geometric mean labeling behavior of some disconnected graphs.

Keywords:*Cycle, Triangular snake, A(T_r), Quadrilateral snake.*

1. Introduction:

Finite, simple and undirected graphs are considered here. We pursue [1] for symbols and phrases. The motivation of the works done by [2],[3],[4],[5]. The notion of Skolem Difference odd Geometric Mean labeling of Some Graphs was introduced in [6].

Definition 1.1:

Let Z (D,O) be a graph where D and O are the set of all p dots and q lines of a graph.If f:D(Z) → {1 ,3,5......2q+1} is injective and the induced map f*: O(Z)→{1,3,5.....2q-1} defined as

$f^*(e=tv) = \lfloor\sqrt{f(t)f(v)}\rfloor$ or $\lceil\sqrt{f(t)f(v)}\rceil$,

is bijective, then the function f is said to be a skolem difference odd geometric mean labeling. A graph known as a “skolem Difference odd geometric mean graph” if it admits skolem Difference odd geometric mean labeling.

Definition1.2:

The Union of two graphs $Z_1=(D_1,O_1)$ and $Z_2=(D_2,O_2)$ is a graph $Z=Z_1\cup Z_2$ with dot set $D=D_1\cup D_2$ and the line set $O=O_1\cup O_2$.

Definition1.3:

A cycle is a closed path with all dots except the end and first being different.

Definition 1.4:[6]

From a path $t_1 t_2 \ldots\ldots t_r$, a Triangular Snake T_r is obtained by attaching t_j and t_{j+1} to a new dot v_j for$1\leq j \leq r-1$. That is every lines of the path is replaced by a C_3 triangle.

Definition1.5:[6]

From a path $t_1 t_2 \ldots\ldots t_r$, an Alternate Triangular snake $A(T_r)$is obtained by attaching t_j and t_{j+1} alternatively to a new dot v_j . That is every alternate lines of the path is replaced by a C_3 triangle.

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Definition1.6:[4]

From a path t_1 t_2,......t_r, a Quadrilateral Snake Q_r is obtained by attaching t_j and t_{j+1} to two new dots v_j and w_j, respectively and then linking v_j and w_j, that is every lines of the path is replaced by a C_4 cycle.

2. Main Results

Theorem2.1

$C_r \cup P_m$ is the skolem difference odd geometric mean graph.

Proof:

Consider $C_r = t_1, t_2, \ldots\ldots t_r$ be the dots of a cycle. Consider $P_m = v_1, v_2, v_3, \ldots\ldots v_m$ be the dots of a path.

Let $Z = C_r \cup P_m$.

Define $f : D(Z) \rightarrow \{1,3,5,7,9 \; ..... \; 2q+1\}$ *by*

$f(t_j) = \{ 2j - 1 \qquad 1 \le j \le r-1$

$\qquad 2j+1 \qquad j=r\}$

$f(v_1) = 2r - 1 \qquad 1 \le j \le r-1$

$f(v_j) = 2r+2j - 1 \qquad 2 \le j \le m$

The lines are labeled as

$f(t_1 \, t_2) = 1$

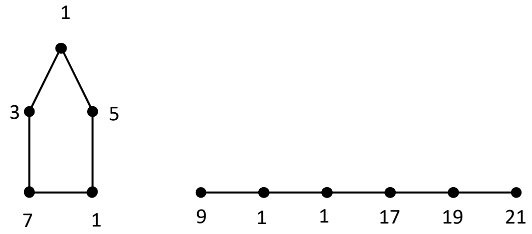
$f(t_j \, t_{j+2}) = 2j+1 \qquad 1 \le j \le r-2$

$f(t_{r-1} \, t_r) = 2r-1$

$f(v_j \, v_{j+1}) = 2r+2j-1 \qquad 1 \le j \le m-1$

The line labels are different.

Example: Skolem difference odd geometric mean labeling of $C_5 \cup P_6$.



Consider T_r be the *Triangular snake* graph. The dot set of T_r be $t_1, t_2, \ldots\ldots t_r$ and $v_1, v_2, v_3, \ldots\ldots v_{r-1}$.

Consider $P_m = y_1, y_2, y_3, \ldots\ldots y_m$ be the dots of a path. Let $Z = T_r \cup P_m$

Define $f : D(Z) \rightarrow \{1,3,5,7,9 \; ..... \; 2q+1\}$ *by*

$f(t_j) = 6j - 5 \qquad 1 \le j \le r$

$f(v_j) = 6j - 3 \qquad 1 \le j \le r-1$

$f(y_1) = f(t_r) - 2$

$f(y_j) = f(y_1) + 2j \qquad 2 \le j \le m$

The lines are labeled as

$f(t_j \, t_{j+1}) = 6j - 3 \qquad 1 \le j \le r-1$

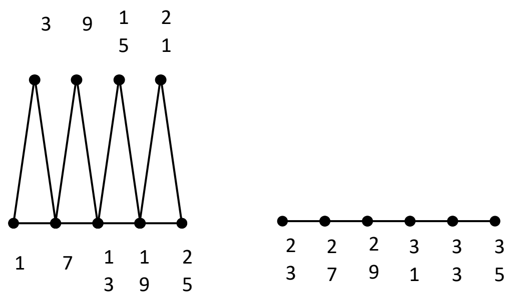
$f(v_j \, t_j) = 6j - 5 \qquad 1 \le j \le r-1$

$f(v_j \, t_{j+1}) = 6j - 1 \qquad 1 \le j \le r-1$

$f(y_j \, y_{j+1}) = f(t_r) + 2j - 2 \qquad 1 \le j \le m-1$

The line labels are different.

Example: Skolem difference odd geometric mean labeling of $T_5 \cup P_6$



Theorem2.3:

$A(T_r) \cup P_m$ is the skolem difference odd geometric mean graph.

Proof:

Consider $A(T_r)$ be the *Alternate Triangular snake* graph.

Consider $P_m = y_1, y_2, y_3, \ldots y_m$ be the dots of a path. Let $Z = A(T_r) \cup P_m$

Define $f : D(Z) \rightarrow \{1,3,5,7,9 \ldots 2q+1\}$ by

$f(t_j) = \{4j - 3$ j is odd

$4j-1$ j is even}

$f(v_j) = 8j - 5$ $1 \leq j \leq r$

$f(y_1) = f(t_r) - 2$

$f(y_j) = f(t_r) + 2j - 2$ $2 \leq j \leq m$

The lines are labeled as

$f(t_j t_{j+1}) = 4j - 1$ $1 \leq j \leq r-1$

$f(t_{2j-1} v_j) = 8j - 7$ $1 \leq j \leq \frac{r}{2}$

$f(t_{2j} v_j) = 8j - 3$ $1 \leq j \leq \frac{r}{2}$

$f(y_j y_{j+1}) = f(y_1) + 2j$ $1 \leq j \leq m-1$

The line labels are different.

Theorem2.4:

$Q_r \cup P_m$ is the skolem difference odd geometric mean graph.

Proof:

Consider Q_r be the Quadrilateral snake graph. The dot set of Q_r be $t_1, t_2, \ldots t_r, v_1, v_2, v_3, \ldots v_{r-1}$, and $w_1, w_2, w_3, \ldots w_{r-1}$.

Consider $P_m = y_1, y_2, y_3, \ldots y_m$ be the dots of a path. Let $Z = Q_r \cup P_m$

Define $f : D(Z) \rightarrow \{1,3,5,7,9 \ldots 2q+1\}$ by

$f(t_j) = 8j - 7$ $1 \leq j \leq r$

$f(v_j) = 8j - 5$ $1 \leq j \leq r-1$

$f(w_1) = 7$

$f(w_{j+1}) = 8j + 5$ $1 \leq j \leq r-2$

$f(y_1) = f(t_r) - 2$

$f(y_j) = f(t_r) + 2j - 2$ $2 \leq j \leq m$

The lines are labeled as

$f(t_1 t_2) = 3$

$f(t_{j+1} t_{j+2}) = 8j + 5$ $1 \leq j \leq r-2$

$f(t_j v_j) = 8j - 7$ $1 \leq j \leq r-1$

$f(v_1 w_1) = 5$

$f(v_{j+1} w_{j+1}) = 8j + 3$ $1 \leq j \leq r-2$

$f(t_{j+1} w_j) = 8j - 1$ $1 \leq j \leq r-1$

$f(y_j y_{j+1}) = f(y_1) + 2j$ $1 \leq j \leq m-1$

The line labels are different.

Theorem2.5:

$P_r \odot K_3 \cup P_m$ is the skolem difference odd geometric mean graph.

Proof:

Consider $P_r \odot K_3$ be the graph, its dots be t_j, v_j and w_j $(1 \leq j \leq r)$

Consider $P_m = y_1, y_2, y_3, \ldots y_m$ be the dots of a path. Let $Z = P_r \odot K_3 \cup P_m$

Define $f : D(Z) \rightarrow \{1,3,5,7,9 \ldots 2q+1\}$ by

$f(t_j) = \{8j - 1$ j is odd

$8j - 7$ j is even}

$f(v_j) = \{8j - 7,$ j is odd

$8j - 5$ j is even}

$f(w_j) = \{8j - 5$ j is odd

$8j - 1$ j is even}

$f(y_1) = \{ f(t_r) - 2$ r is odd

$f(t_r) + 4$ r is even}

$f(y_j) = f(y_1) + 2j$ $2 \leq j \leq m$

The lines are labeled as

$f(t_j t_{j+1}) = 8j - 1$, $1 \leq j \leq r-1$

$f(t_j v_j) = \{8j - 5$ j is odd

$8j - 7$ j is even}

$f(t_j w_j) = \{8j - 3$ j is odd

$8j - 5$ j is even}

$f(v_j w_j) = \{8j - 7$ j is odd

$8j - 3$ j is even }

$f(y_j y_{j+1}) = f(y_1) + 2j$ $1 \leq j \leq m-1$

The line labels are different.

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