

Definition.

Definition. A graph G is n -partite

Definition. A graph G is n -partite if $V(G)$ can be partitioned into n classes

Definition. A graph G is n -partite if $V(G)$ can be partitioned into n classes so that each edge has ends in different classes.

Definition. A graph G is n -partite if $V(G)$ can be partitioned into n classes so that each edge has ends in different classes. If $n = 2$, the graph is called bipartite.

Definition. A graph G is n -partite if $V(G)$ can be partitioned into n classes so that each edge has ends in different classes. If $n = 2$, the graph is called bipartite.

A bipartite graph cannot contain a cycle of odd length.

Definition. A graph G is n -partite if $V(G)$ can be partitioned into n classes so that each edge has ends in different classes. If $n = 2$, the graph is called bipartite.

A bipartite graph cannot contain a cycle of odd length.

Theorem.

Definition. A graph G is n -partite if $V(G)$ can be partitioned into n classes so that each edge has ends in different classes. If $n = 2$, the graph is called bipartite.

A bipartite graph cannot contain a cycle of odd length.

Theorem. *A graph that does not contain a cycle of odd length is bipartite.*

Definition. A graph G is n -partite if $V(G)$ can be partitioned into n classes so that each edge has ends in different classes. If $n = 2$, the graph is called bipartite.

A bipartite graph cannot contain a cycle of odd length.

Theorem. *A graph that does not contain a cycle of odd length is bipartite.*

Proof. □

Definition. A graph G is n -partite if $V(G)$ can be partitioned into n classes so that each edge has ends in different classes. If $n = 2$, the graph is called bipartite.

A bipartite graph cannot contain a cycle of odd length.

Theorem. *A graph that does not contain a cycle of odd length is bipartite.*

Proof. Consider the spanning tree. □

Definition. A graph G is n -partite if $V(G)$ can be partitioned into n classes so that each edge has ends in different classes. If $n = 2$, the graph is called bipartite.

A bipartite graph cannot contain a cycle of odd length.

Theorem. *A graph that does not contain a cycle of odd length is bipartite.*

Proof. Consider the spanning tree. Choose a vertex on the tree. □

Definition. A graph G is n -partite if $V(G)$ can be partitioned into n classes so that each edge has ends in different classes. If $n = 2$, the graph is called bipartite.

A bipartite graph cannot contain a cycle of odd length.

Theorem. *A graph that does not contain a cycle of odd length is bipartite.*

Proof. Consider the spanning tree. Choose a vertex on the tree. Split into odd and even distance away from $v \dots$ □

Definition. A graph G is n -partite if $V(G)$ can be partitioned into n classes so that each edge has ends in different classes. If $n = 2$, the graph is called bipartite.

A bipartite graph cannot contain a cycle of odd length.

Theorem. *A graph that does not contain a cycle of odd length is bipartite.*

Proof. Consider the spanning tree. Choose a vertex on the tree. Split into odd and even distance away from $v \dots$ \square

Euler circuits

Definition. A graph G is n -partite if $V(G)$ can be partitioned into n classes so that each edge has ends in different classes. If $n = 2$, the graph is called bipartite.

A bipartite graph cannot contain a cycle of odd length.

Theorem. *A graph that does not contain a cycle of odd length is bipartite.*

Proof. Consider the spanning tree. Choose a vertex on the tree. Split into odd and even distance away from $v \dots$ \square

Euler circuits

Definition.

Definition. A graph G is n -partite if $V(G)$ can be partitioned into n classes so that each edge has ends in different classes. If $n = 2$, the graph is called bipartite.

A bipartite graph cannot contain a cycle of odd length.

Theorem. *A graph that does not contain a cycle of odd length is bipartite.*

Proof. Consider the spanning tree. Choose a vertex on the tree. Split into odd and even distance away from $v \dots$ \square

Euler circuits

Definition. A walk of length n is a finite sequence

Definition. A graph G is n -partite if $V(G)$ can be partitioned into n classes so that each edge has ends in different classes. If $n = 2$, the graph is called bipartite.

A bipartite graph cannot contain a cycle of odd length.

Theorem. *A graph that does not contain a cycle of odd length is bipartite.*

Proof. Consider the spanning tree. Choose a vertex on the tree. Split into odd and even distance away from $v \dots$ \square

Euler circuits

Definition. A walk of length n is a finite sequence v_0

Definition. A graph G is n -partite if $V(G)$ can be partitioned into n classes so that each edge has ends in different classes. If $n = 2$, the graph is called bipartite.

A bipartite graph cannot contain a cycle of odd length.

Theorem. *A graph that does not contain a cycle of odd length is bipartite.*

Proof. Consider the spanning tree. Choose a vertex on the tree. Split into odd and even distance away from $v \dots$ \square

Euler circuits

Definition. A walk of length n is a finite sequence $v_0 e_1$

Definition. A graph G is n -partite if $V(G)$ can be partitioned into n classes so that each edge has ends in different classes. If $n = 2$, the graph is called bipartite.

A bipartite graph cannot contain a cycle of odd length.

Theorem. *A graph that does not contain a cycle of odd length is bipartite.*

Proof. Consider the spanning tree. Choose a vertex on the tree. Split into odd and even distance away from $v \dots$ \square

Euler circuits

Definition. A walk of length n is a finite sequence
 $v_0 e_1 v_1$

Definition. A graph G is n -partite if $V(G)$ can be partitioned into n classes so that each edge has ends in different classes. If $n = 2$, the graph is called bipartite.

A bipartite graph cannot contain a cycle of odd length.

Theorem. *A graph that does not contain a cycle of odd length is bipartite.*

Proof. Consider the spanning tree. Choose a vertex on the tree. Split into odd and even distance away from $v \dots$ \square

Euler circuits

Definition. A walk of length n is a finite sequence
 $v_0 e_1 v_1 e_2$

Definition. A graph G is n -partite if $V(G)$ can be partitioned into n classes so that each edge has ends in different classes. If $n = 2$, the graph is called bipartite.

A bipartite graph cannot contain a cycle of odd length.

Theorem. *A graph that does not contain a cycle of odd length is bipartite.*

Proof. Consider the spanning tree. Choose a vertex on the tree. Split into odd and even distance away from $v \dots$ \square

Euler circuits

Definition. A walk of length n is a finite sequence $v_0 e_1 v_1 e_2 \dots e_n$

Definition. A graph G is n -partite if $V(G)$ can be partitioned into n classes so that each edge has ends in different classes. If $n = 2$, the graph is called bipartite.

A bipartite graph cannot contain a cycle of odd length.

Theorem. *A graph that does not contain a cycle of odd length is bipartite.*

Proof. Consider the spanning tree. Choose a vertex on the tree. Split into odd and even distance away from $v \dots$ \square

Euler circuits

Definition. A walk of length n is a finite sequence $v_0 e_1 v_1 e_2 \dots e_n v_n$,

Definition. A graph G is n -partite if $V(G)$ can be partitioned into n classes so that each edge has ends in different classes. If $n = 2$, the graph is called bipartite.

A bipartite graph cannot contain a cycle of odd length.

Theorem. *A graph that does not contain a cycle of odd length is bipartite.*

Proof. Consider the spanning tree. Choose a vertex on the tree. Split into odd and even distance away from $v \dots$ \square

Euler circuits

Definition. A walk of length n is a finite sequence $v_0 e_1 v_1 e_2 \dots e_n v_n$, such that v_i s are vertices,

Definition. A graph G is n -partite if $V(G)$ can be partitioned into n classes so that each edge has ends in different classes. If $n = 2$, the graph is called bipartite.

A bipartite graph cannot contain a cycle of odd length.

Theorem. *A graph that does not contain a cycle of odd length is bipartite.*

Proof. Consider the spanning tree. Choose a vertex on the tree. Split into odd and even distance away from $v \dots$ \square

Euler circuits

Definition. A walk of length n is a finite sequence $v_0e_1v_1e_2 \dots e_nv_n$, such that v_i s are vertices, e_i s are edges,

Definition. A graph G is n -partite if $V(G)$ can be partitioned into n classes so that each edge has ends in different classes. If $n = 2$, the graph is called bipartite.

A bipartite graph cannot contain a cycle of odd length.

Theorem. *A graph that does not contain a cycle of odd length is bipartite.*

Proof. Consider the spanning tree. Choose a vertex on the tree. Split into odd and even distance away from $v \dots$ \square

Euler circuits

Definition. A walk of length n is a finite sequence $v_0e_1v_1e_2 \dots e_nv_n$, such that v_i s are vertices, e_i s are edges, and $v_{i-1}, v_i \in e_i$.

Definition. A graph G is n -partite if $V(G)$ can be partitioned into n classes so that each edge has ends in different classes. If $n = 2$, the graph is called bipartite.

A bipartite graph cannot contain a cycle of odd length.

Theorem. *A graph that does not contain a cycle of odd length is bipartite.*

Proof. Consider the spanning tree. Choose a vertex on the tree. Split into odd and even distance away from $v \dots$ \square

Euler circuits

Definition. A walk of length n is a finite sequence $v_0 e_1 v_1 e_2 \dots e_n v_n$, such that v_i s are vertices, e_i s are edges, and $v_{i-1}, v_i \in e_i$.

Definition. A graph G is n -partite if $V(G)$ can be partitioned into n classes so that each edge has ends in different classes. If $n = 2$, the graph is called bipartite.

A bipartite graph cannot contain a cycle of odd length.

Theorem. *A graph that does not contain a cycle of odd length is bipartite.*

Proof. Consider the spanning tree. Choose a vertex on the tree. Split into odd and even distance away from $v \dots$ \square

Euler circuits

Definition. A walk of length n is a finite sequence $v_0e_1v_1e_2 \dots e_nv_n$, such that v_i s are vertices, e_i s are edges, and $v_{i-1}, v_i \in e_i$.

Definition. A trail is a walk in which no edge is repeated.

Definition. A graph G is n -partite if $V(G)$ can be partitioned into n classes so that each edge has ends in different classes. If $n = 2$, the graph is called bipartite.

A bipartite graph cannot contain a cycle of odd length.

Theorem. *A graph that does not contain a cycle of odd length is bipartite.*

Proof. Consider the spanning tree. Choose a vertex on the tree. Split into odd and even distance away from $v \dots$ \square

Euler circuits

Definition. A walk of length n is a finite sequence $v_0e_1v_1e_2 \dots e_nv_n$, such that v_i s are vertices, e_i s are edges, and $v_{i-1}, v_i \in e_i$.

Definition. A trail is a walk in which no edge is repeated. If it is closed, it is called a tour.

Definition. A graph G is n -partite if $V(G)$ can be partitioned into n classes so that each edge has ends in different classes. If $n = 2$, the graph is called bipartite.

A bipartite graph cannot contain a cycle of odd length.

Theorem. *A graph that does not contain a cycle of odd length is bipartite.*

Proof. Consider the spanning tree. Choose a vertex on the tree. Split into odd and even distance away from $v \dots$ \square

Euler circuits

Definition. A walk of length n is a finite sequence $v_0e_1v_1e_2 \dots e_nv_n$, such that v_i s are vertices, e_i s are edges, and $v_{i-1}, v_i \in e_i$.

Definition. A trail is a walk in which no edge is repeated. If it is closed, it is called a tour.

Definition.

Definition. A graph G is n -partite if $V(G)$ can be partitioned into n classes so that each edge has ends in different classes. If $n = 2$, the graph is called bipartite.

A bipartite graph cannot contain a cycle of odd length.

Theorem. *A graph that does not contain a cycle of odd length is bipartite.*

Proof. Consider the spanning tree. Choose a vertex on the tree. Split into odd and even distance away from $v \dots$ \square

Euler circuits

Definition. A walk of length n is a finite sequence $v_0e_1v_1e_2 \dots e_nv_n$, such that v_i s are vertices, e_i s are edges, and $v_{i-1}, v_i \in e_i$.

Definition. A trail is a walk in which no edge is repeated. If it is closed, it is called a tour.

Definition. A trail of G is an Euler trail if each edge of G is included,

Definition. A graph G is n -partite if $V(G)$ can be partitioned into n classes so that each edge has ends in different classes. If $n = 2$, the graph is called bipartite.

A bipartite graph cannot contain a cycle of odd length.

Theorem. *A graph that does not contain a cycle of odd length is bipartite.*

Proof. Consider the spanning tree. Choose a vertex on the tree. Split into odd and even distance away from $v \dots$ \square

Euler circuits

Definition. A walk of length n is a finite sequence $v_0e_1v_1e_2 \dots e_nv_n$, such that v_i s are vertices, e_i s are edges, and $v_{i-1}, v_i \in e_i$.

Definition. A trail is a walk in which no edge is repeated. If it is closed, it is called a tour.

Definition. A trail of G is an Euler trail if each edge of G is included, i.e.

Definition. A graph G is n -partite if $V(G)$ can be partitioned into n classes so that each edge has ends in different classes. If $n = 2$, the graph is called bipartite.

A bipartite graph cannot contain a cycle of odd length.

Theorem. *A graph that does not contain a cycle of odd length is bipartite.*

Proof. Consider the spanning tree. Choose a vertex on the tree. Split into odd and even distance away from $v \dots$ \square

Euler circuits

Definition. A walk of length n is a finite sequence $v_0e_1v_1e_2 \dots e_nv_n$, such that v_i s are vertices, e_i s are edges, and $v_{i-1}, v_i \in e_i$.

Definition. A trail is a walk in which no edge is repeated. If it is closed, it is called a tour.

Definition. A trail of G is an Euler trail if each edge of G is included, i.e. each edge occurs exactly once.

Definition. A graph G is n -partite if $V(G)$ can be partitioned into n classes so that each edge has ends in different classes. If $n = 2$, the graph is called bipartite.

A bipartite graph cannot contain a cycle of odd length.

Theorem. *A graph that does not contain a cycle of odd length is bipartite.*

Proof. Consider the spanning tree. Choose a vertex on the tree. Split into odd and even distance away from $v \dots$ \square

Euler circuits

Definition. A walk of length n is a finite sequence $v_0e_1v_1e_2 \dots e_nv_n$, such that v_i s are vertices, e_i s are edges, and $v_{i-1}, v_i \in e_i$.

Definition. A trail is a walk in which no edge is repeated. If it is closed, it is called a tour.

Definition. A trail of G is an Euler trail if each edge of G is included, i.e. each edge occurs exactly once. If it is a tour, it is called an Euler tour.

Definition. A graph G is n -partite if $V(G)$ can be partitioned into n classes so that each edge has ends in different classes. If $n = 2$, the graph is called bipartite.

A bipartite graph cannot contain a cycle of odd length.

Theorem. *A graph that does not contain a cycle of odd length is bipartite.*

Proof. Consider the spanning tree. Choose a vertex on the tree. Split into odd and even distance away from $v \dots$ \square

Euler circuits

Definition. A walk of length n is a finite sequence $v_0e_1v_1e_2 \dots e_nv_n$, such that v_i s are vertices, e_i s are edges, and $v_{i-1}, v_i \in e_i$.

Definition. A trail is a walk in which no edge is repeated. If it is closed, it is called a tour.

Definition. A trail of G is an Euler trail if each edge of G is included, i.e. each edge occurs exactly once. If it is a tour, it is called an Euler tour.

Definition.

Definition. A graph G is n -partite if $V(G)$ can be partitioned into n classes so that each edge has ends in different classes. If $n = 2$, the graph is called bipartite.

A bipartite graph cannot contain a cycle of odd length.

Theorem. *A graph that does not contain a cycle of odd length is bipartite.*

Proof. Consider the spanning tree. Choose a vertex on the tree. Split into odd and even distance away from $v \dots$ \square

Euler circuits

Definition. A walk of length n is a finite sequence $v_0e_1v_1e_2 \dots e_nv_n$, such that v_i s are vertices, e_i s are edges, and $v_{i-1}, v_i \in e_i$.

Definition. A trail is a walk in which no edge is repeated. If it is closed, it is called a tour.

Definition. A trail of G is an Euler trail if each edge of G is included, i.e. each edge occurs exactly once. If it is a tour, it is called an Euler tour.

Definition. A graph is Eulerian if it has an Euler tour.

Definition. A graph G is n -partite if $V(G)$ can be partitioned into n classes so that each edge has ends in different classes. If $n = 2$, the graph is called bipartite.

A bipartite graph cannot contain a cycle of odd length.

Theorem. *A graph that does not contain a cycle of odd length is bipartite.*

Proof. Consider the spanning tree. Choose a vertex on the tree. Split into odd and even distance away from $v \dots$ \square

Euler circuits

Definition. A walk of length n is a finite sequence $v_0 e_1 v_1 e_2 \dots e_n v_n$, such that v_i s are vertices, e_i s are edges, and $v_{i-1}, v_i \in e_i$.

Definition. A trail is a walk in which no edge is repeated. If it is closed, it is called a tour.

Definition. A trail of G is an Euler trail if each edge of G is included, i.e. each edge occurs exactly once. If it is a tour, it is called an Euler tour.

Definition. A graph is Eulerian if it has an Euler tour.

Theorem.

Definition. A graph G is n -partite if $V(G)$ can be partitioned into n classes so that each edge has ends in different classes. If $n = 2$, the graph is called bipartite.

A bipartite graph cannot contain a cycle of odd length.

Theorem. *A graph that does not contain a cycle of odd length is bipartite.*

Proof. Consider the spanning tree. Choose a vertex on the tree. Split into odd and even distance away from $v \dots$ \square

Euler circuits

Definition. A walk of length n is a finite sequence $v_0 e_1 v_1 e_2 \dots e_n v_n$, such that v_i s are vertices, e_i s are edges, and $v_{i-1}, v_i \in e_i$.

Definition. A trail is a walk in which no edge is repeated. If it is closed, it is called a tour.

Definition. A trail of G is an Euler trail if each edge of G is included, i.e. each edge occurs exactly once. If it is a tour, it is called an Euler tour.

Definition. A graph is Eulerian if it has an Euler tour.

Theorem. *A graph for which the degree of each vertex is at least 2 must contain a cycle.*

Definition. A graph G is n -partite if $V(G)$ can be partitioned into n classes so that each edge has ends in different classes. If $n = 2$, the graph is called bipartite.

A bipartite graph cannot contain a cycle of odd length.

Theorem. *A graph that does not contain a cycle of odd length is bipartite.*

Proof. Consider the spanning tree. Choose a vertex on the tree. Split into odd and even distance away from $v \dots$ □

Euler circuits

Definition. A walk of length n is a finite sequence $v_0 e_1 v_1 e_2 \dots e_n v_n$, such that v_i s are vertices, e_i s are edges, and $v_{i-1}, v_i \in e_i$.

Definition. A trail is a walk in which no edge is repeated. If it is closed, it is called a tour.

Definition. A trail of G is an Euler trail if each edge of G is included, i.e. each edge occurs exactly once. If it is a tour, it is called an Euler tour.

Definition. A graph is Eulerian if it has an Euler tour.

Theorem. *A graph for which the degree of each vertex is at least 2 must contain a cycle.*

Theorem.

Definition. A graph G is n -partite if $V(G)$ can be partitioned into n classes so that each edge has ends in different classes. If $n = 2$, the graph is called bipartite.

A bipartite graph cannot contain a cycle of odd length.

Theorem. *A graph that does not contain a cycle of odd length is bipartite.*

Proof. Consider the spanning tree. Choose a vertex on the tree. Split into odd and even distance away from $v \dots$

□

Euler circuits

Definition. A walk of length n is a finite sequence $v_0 e_1 v_1 e_2 \dots e_n v_n$, such that v_i s are vertices, e_i s are edges, and $v_{i-1}, v_i \in e_i$.

Definition. A trail is a walk in which no edge is repeated. If it is closed, it is called a tour.

Definition. A trail of G is an Euler trail if each edge of G is included, i.e. each edge occurs exactly once. If it is a tour, it is called an Euler tour.

Definition. A graph is Eulerian if it has an Euler tour.

Theorem. *A graph for which the degree of each vertex is at least 2 must contain a cycle.*

Theorem. *A connected graph is an Euler graph if and only if the degree of each vertex is even.*