|  |  |
| --- | --- |
| (Q1 False: ...is an odd integer)  In any graph, the sum of the degrees of the vertices is an even integer. | The length of a path is the number of edges on it.  (Q2 False: The length of a path is the number of vertices on it) |
| (Q3 : True)  Degree Sequence of a graph G is the sequence formed from the degrees of its  vertices,usually arranged in descending order of size. | A path is an alternating sequence of vertices and edges if the form  v1e1v2e2  (Q4 False: End with an edge) |
| (Q5 - True)  The length of a cycle is the number of edges on it. | (Q6: Is it possible to have a degree sequence 4,4,3,3,2,2  Yes. The sum of the degrees is an even number) |
| (Q7 - 6 vertices - k6 True - R code below) | (Q8 - 7 vertices - False) |
| (Q9 : Every graph must have an even number of vertices of odd degree)  (False: it is not a necessary condition) | (Q10 - by definition a K6 graph is 6-regular - false) |
| Q11: Suppose a graph has the degree sequence 4,2,2,2  Is it possible for the graph to be a simple graph?  False | Q12: Suppose a graph G has the following degree sequence  4,3,3,3,2,2,1  How many vertices are there|  6  9  18  12  Answer: There are six vertices |
| Q13: Suppose a graph G has the following degree sequence  4,3,3,3,2,2,1  How many Edges are there|  6  9  18  12  There are 9 edges | Question 14:  Suppose a graph has 4 vertices. How many elements (either "0" or "1" ) are in the adjacency matrix  4  8  16  64  Answer: there are 16 |
| Question 15 | Question 16  Which of the following four items is not part of the adjacency list  A) u: w  B) v: w,x  C) w: u,x FALSE  D) x: v,w |
| Question 17  For simple graphs, there is at most one edge between each pair of Vertices   1. TRUE 2. FALSE   T | Question 18  For a simple graph: The sum of the degrees of the vertices are equal is the number of edges of  G  False: it is twice the number of edges of G |
| Question 19 : Connected  The graph G is said to be connected if each pair of vertices is connected.  T/F  True | Question 20 : Isomorphic Graphs  Theory question  Which of the following statements is false  Two given graphs are NOT isomorphic if  a) They have a different number of connected components.  b) They have the same number of vertices.  c) They have different degree sequences.  d) They have a different number of paths of any given length.  Answer: B |

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5.1 What is a graph

5.1.1 Some definitions

5.1.2 Degree of a vertex

Degree Sequence of a graph G is the sequence formed from the degrees of its

vertices,usually arranged in descending order of size.

(Q3 : True)

(Q6: Is it possible to have a degree sequence 4,4,3,3,2,2

Yes. The sum of the degrees is an even number)

In any graph, the sum of the degrees of the vertices is an even integer.

(Q1 False: ...is an odd integer)

5.1.3 Some special graphs

-r-regulae

-Kn

-(Q7 - 6 vertices - k6 True - R code below)

-(Q8 - 7 vertices - False)

-(Q10 - by definition a K6 graph is 6-regular - false)

%-------------------------------------------------%

5.2 Paths, Cycles and Connectivity

5.2.1 Paths

A path is an alternating sequence of vertices and edges if the form

v1e1v2e2

(Q4 False: End with an edge)

(Q9 : Every graph must have an even number of vertices of odd degree)

(False: it is not a necceasry codition)

The Length of a path is the number of edges on it.

(Q2 False: The length of a path is the number of vertices on it)

5.2.2 Cycles

The length of a cycle is the number of edges on it.

(Q5 - True)

we refer to a cycle of length k as a k-cycle.

5.2.3 Connectivity

Disconnected and connected

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5.3 Isomorphism of Graphs

Definition: Graph Isomorphism

5.3.1 Showing that two graphs are isomorphic

5.4 Adjacency Matrices and Adjacency Lists

5.4.1 Adjacency matrix of a graph

5.4.2 Adjacemcy list

%--------------------------------------------------%

Ax=100

Ay=50

Bx=150

By=50

Cx=(150+50\*cos(pi/3))

Cy=(50+50\*sin(pi/3))

Dx=150

Dy=(50+100\*sin(pi/3))

Ex=100

Ey=Dy

Fx=Ax-50\*cos(pi/3)

Fy=Cy

Gx=125

Gy=Fy

plot(c(Ax,Bx,Cx,Dx,Ex,Fx),c(Ay,By,Cy,Dy,Ey,Fy),pch=18, cex=2.6,lwd=2)

#plot(c(Ax,Bx,Cx,Dx,Ex,Fx,Gx),c(Ay,By,Cy,Dy,Ey,Fy,Gy),pch=18,cex=2.6,lwd=2)

lines(c(Ax,Bx),c(Ay,By))

lines(c(Ax,Fx),c(Ay,Fy))

lines(c(Bx,Cx),c(By,Cy))

lines(c(Cx,Dx),c(Cy,Dy))

lines(c(Dx,Ex),c(Dy,Ey))

lines(c(Ex,Fx),c(Ey,Fy))

#R -regular with degree 3

lines(c(Ax,Dx),c(Ay,Dy))

lines(c(Bx,Ex),c(By,Ey))

lines(c(Cx,Fx),c(Cy,Fy))

#Complete graph

lines(c(Ax,Cx),c(Ay,Cy))

lines(c(Ax,Ex),c(Ay,Ey))

lines(c(Bx,Dx),c(By,Dy))

lines(c(Bx,Fx),c(By,Fy))

lines(c(Cx,Ex),c(Cy,Ey))

lines(c(Dx,Fx),c(Dy,Fy))

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