Assume these are simple graphs unless mentioned otherwise.
Is there a graph with 102 vertices, such that 49 vertices have degree 5 and the remaining 53 vertices have degree 6? no

102 vertices → 49 vertices → 5 degree
102 vertices → 53 vertices → 6 degree

Handshaking ⇒ $49(5) + 53(6) \neq$ even #

A tree has eight vertices of degree 1, three vertices of degree 2, and two vertices of degree 3. The other vertices all have degree 4. How many vertices must there be altogether?

- handshaking lemma
- n V, n-1 e

sum of degree : $8(1) + 3(2) + 2(3) + x(4) = 20 + 4x$

$2(e) = 2(V-1)$

$20 + 4x = 2(V-1)$
$20 + 4x = 2V - 2$
$V = 11 + 2x$

$11 + 2x = 8 + 3 + 2 + x$
$x = 2$

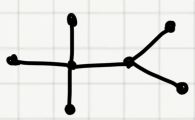
HENCE...
$V = 8+3+2+2$
$= 15$
#

Draw a tree whose vertices have the following degrees, or explain why no such tree exists:
(a) seven vertices, with degrees 1, 1, 1, 1, 1, 3, 4;
(b) eight vertices, with degrees 1, 1, 2, 2, 2, 2, 3, 3.

① sum of degree = 2e
② n V → n-1 e

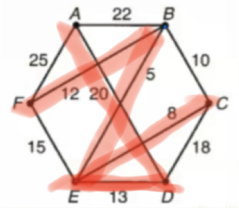
(a) sum of degree = 12 ; e = 6 ⇒ Exist

(b) sum of degree = 16 ; e = 8 ⇒ NOT Exist

(a)


Example 11.2.1 Use Prim's algorithm to find a minimal spanning tree for the weighted graph shown in Figure 11.4.

Figure 11.4



label possible once only

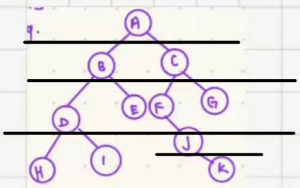
Let m be the number of odd degree vertices of a graph. Which of the following options ~~are~~ always true.

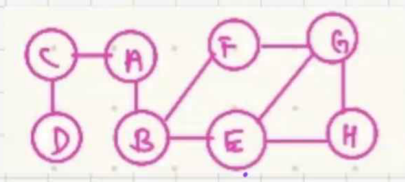
5

a. M is odd
b. M is a multiple of 4
c. M is even
d. None is true
e. More than 1 is true

The graph G has 6 vertices with degrees 1,2,2,3,3,5. How many edges does G have?Does G have an Euler path?

Traverse with DFS & BFS





DFS → stack (last in first out)
BFS → queue (first in first out)

(a) DFS : abcdefghijk
BFS : abcdhiecfjkg

(b)

bfs queue

D | C B
V | A

D | B D
V | A C

D | D F E
V | A C B

D | F E
V | A C B D

D | E G
V | A C B D F

D | G H
V | A C B D F E

D |
V | A C B D F E G H