Jalen Powell 11/14/2021
Comp 3240

Hw 12

#12.1.1

a) Degree of vertex 1 = 2
Degree of vertex 2 = 3
Degree of vertex 3 = 2
Vertex 4 = 1
Vertex 5 = 5
Vertex 6 = 1
2+3+2+1+5+1 = 14

b) The neighbours of vertex 5 = vertex 1, vertex 2, vertex 3, vertex 4, vertex 6

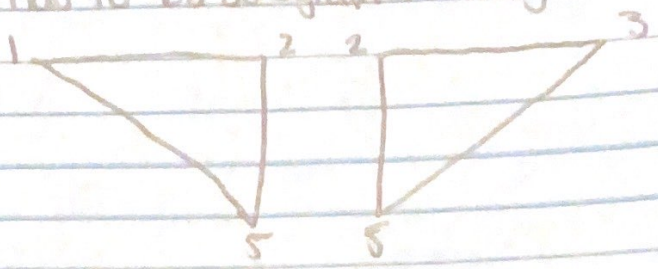
c) Degree of vertex 6 = 1

d) The set of vertices adjacent to 3 {2, 5}

e) deg (1) = 2 ≠ 3 = deg (2)
G1 is not regular

g) Four vertices of K_4 has 3 edges each
all four vertices of degree 3.
Only on vertex (2) is of 3.
↳ has no subgraphs of K_4 type

f.) The graph has to K_3 subgraphs. They are



#12.1.3

a.) No it is not possible to have a 3-regular graphs on 5 vertices.
For any graphs G_1, the number of odd degree vertices are even. 3-regular will have an even # of vertices.

b.)

#12.1.4

a.) Total # of edges = $3 \times 4 = 12$
$K_{3,4}$ is not regular graph
$K_{3,4}$ is complete bipatite graph

b.) The graph has $v = 5$ vertices and $e = 10$ edges
K_5 is not regular graph
K_5 is complete graph

c.) $K_n = C_n = 3$

d.) Smallest value for C_n is 3 and $C_3 \neq Q_3$
C_3 has 3 vertices but Q_3 has 8 vertices

#12.1.4

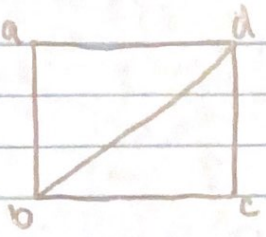
c.) The n-cube denoted by Qn

Qn has 2^n vertices

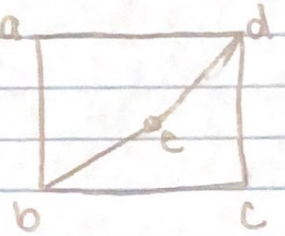
$|E| = \frac{|v|}{2} n = n_2^{n-1}$

#12.2.1

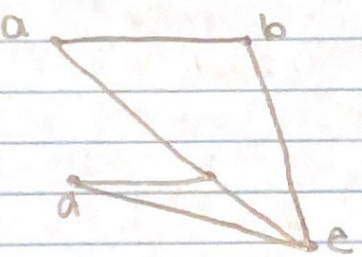
a.)



b.)



c.)



#12.2.2

a.)

1	→ 2
2	→ 1 → 3 → 5
3	→ 2 → 5
4	→ 5
5	→ 1 → 2 → 3 → 4 → 6
6	→ 5

b.)

0	1	0	0	1	0
1	0	1	0	1	0
0	1	0	0	1	0
0	0	0	0	1	0
1	1	1	1	0	1
0	0	0	0	1	0

12.2.3

a) graph 1
$V = \{a, b, c, d\}$
$E = \{\{a,c\}, \{b,a\}, \{c,a\}, \{c,d\}, \{d,b\}, \{d,c\}\}$

graph 2
$V' = \{a, b, c, d\}$
$E' = \{\{a,c\}, \{b,d\}, \{c,a\}, \{c,d\}, \{d,b\}, \{d,c\}\}$

$E = E'$ $V = V'$

They are equal

b) graph 1
$V = \{a, b, c, d, e\}$
$E = \{\{a,b\}, \{a,c\}, \{b,a\}, \{b,c\}, \{c,a\}, \{c,b\}, \{c,d\}, \{c,c\}, \{d,c\}, \{a,c\}, \{c,c\}, \{e,d\}\}$

graph 2
$V' = \{a, b, c, d, e\}$
$E' = \{\{a,b\}, \{a,c\}, \{b,a\}, \{b,c\}, \{c,a\}, \{c,b\}, \{c,d\}, \{c,c\}, \{a,c\}, \{d,c\}, \{c,c\}, \{c,a\}\}$

$E = E'$ and $V = V'$

They are equal

c) $\{d,e\}, \{e,a\} \in E'$ but $\{d,c\}, \{e,d\} \notin E$
$E \neq E'$ are not equal

d) $V' = \{a, b, c, d, e\}$
The graphs are not equal

12.4.1

a) $\{a, b\}$
$\{c, d, e\}$
$\{g\}$
$\{f, i, j, h\}$

b) $\{a\}$
$\{b\}$
$\{c\}$
$\{d\}$
$\{e\}$

c) $\{a, b, c, d, e, f\}$