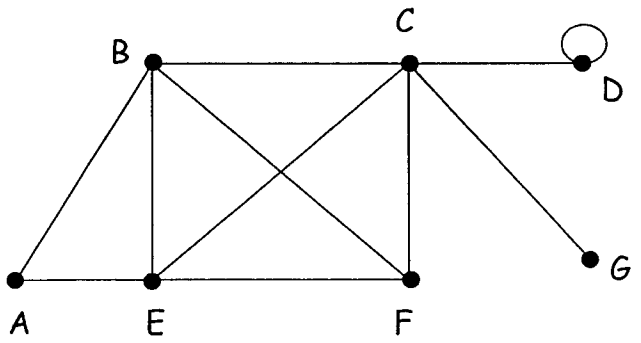
Worksheet #3—The "Handshaking Theorem"

For each graph, complete the chart and information.

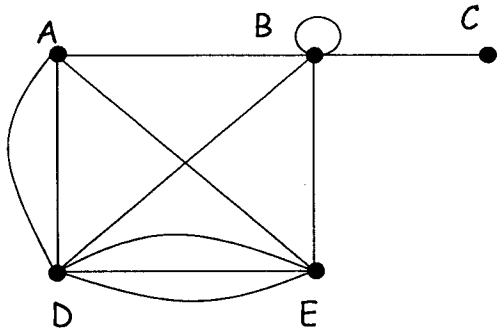
1.



vertex	degree
A	2
B	4
C	5
D	3
E	4
F	3
G	1

sum of the degrees = 22 # of edges = 11

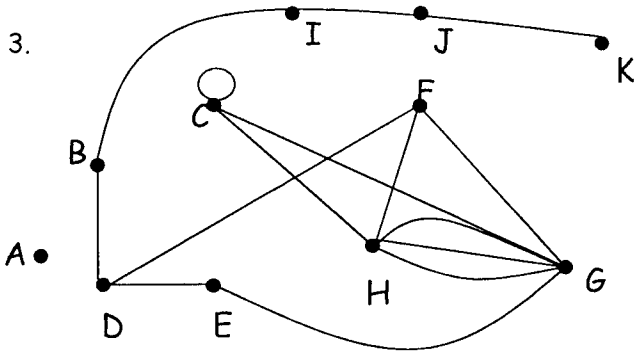
2.



vertex	degree
A	4
B	6
C	1
D	6
E	5

sum of the degrees = 22 # of edges = 11

3.

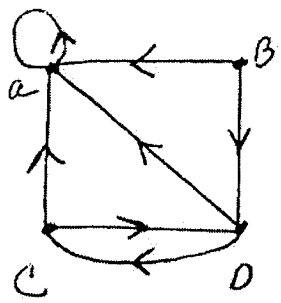


vertex	degree
A	0
B	2
C	4
D	3
E	2
F	3
G	6
H	5
I	2
J	2
K	1

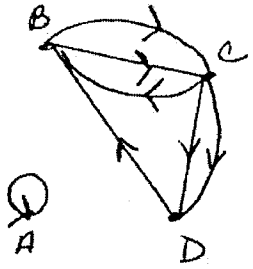
sum of the degrees = 30 # of edges = 15

For each of the graphs below, determine the in-degree and out-degree of each vertex (write near the vertex for each graph). Then complete the chart for each graph.

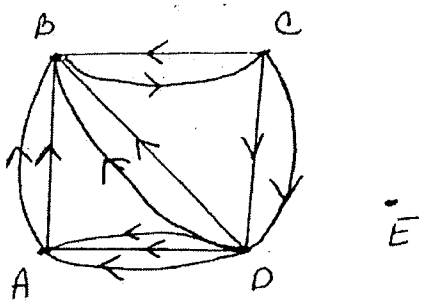
1.



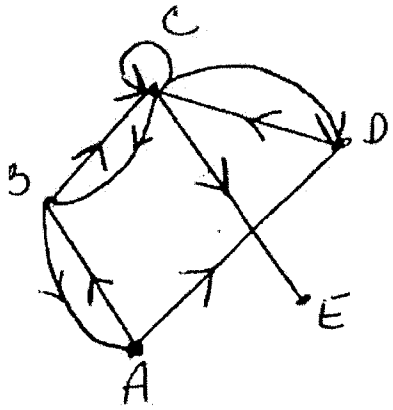
2.



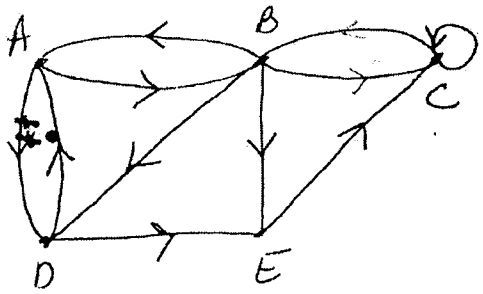
3.



4.

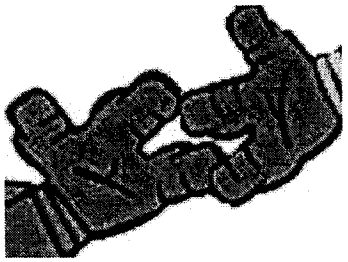


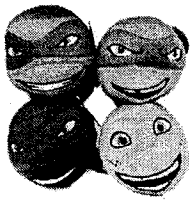
5.

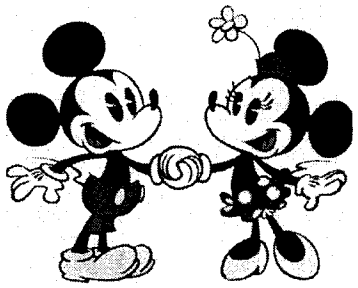


Graph #	# of vertices	# of edges	in-degree	out-degree	sum of in-degree and out-degree
1	4	7	7	7	14
2	4	7	7	7	14
3	5	11	11	11	22
4	5	9	9	9	18
5	5	11	11	11	22

The Handshaking Theorem: The sum of the degrees of all the vertices of a graph is twice the number of edges. The number of vertices of odd degree in a graph is always even.







Worksheet #4—Hamilton Paths & Circuits

1. For the given graph, does each of the following lists of vertices form a path? If so, is it a simple path? Is it a circuit? What is the length of each path?

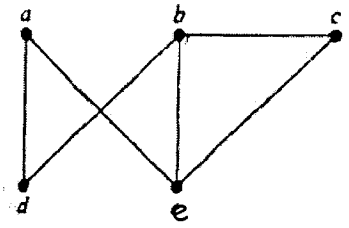
for graph A:

vertices	form a path?	simple path?	circuit?	length?
a, e, b, c, b	yes	no	no	4
a, e, a, d, b, c, a	no	—	—	—
e, b, a, d, b, e	no	—	—	—
c, b, d, a, e, c	yes	yes	yes	5

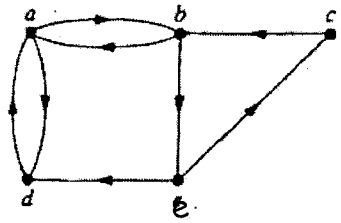
for graph B:

vertices	form a path?	simple path?	circuit?	length?
a, b, e, c, b	yes	yes	no	4
a, d, a, d, a	yes	no	yes	4
a, d, b, e, a	no	—	—	—
a, b, e, c, b, d, a	no	—	—	—

graph A

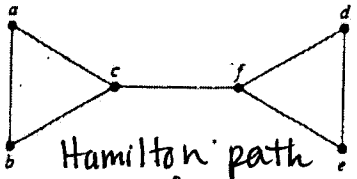


graph B



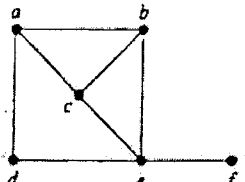
2. Determine whether each graph has a Hamilton circuit, Hamilton path, or neither. Specify the name of each path or circuit.

A.



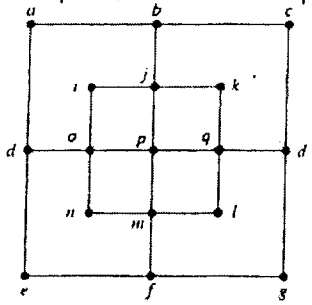
Hamilton path
abcfde

B.



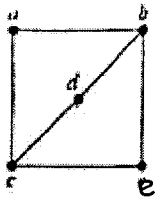
Hamilton path
fedacb

C.



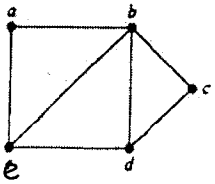
neither

D.



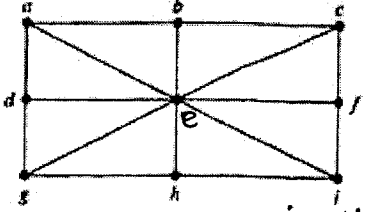
Hamilton path
ecdba

E.



Hamilton circuit
aedcba

F.



Hamilton circuit
eifcbadghe

* paths & circuits may vary