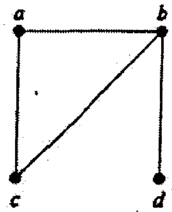
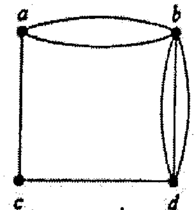
Worksheet #2—Types of Graphs

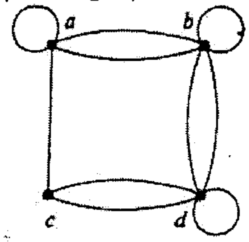
Classify each graph as a simple graph, multigraph, pseudograph, directed graph, or directed multigraph.

1. 

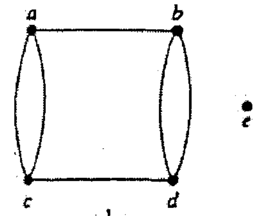
simple

2. 

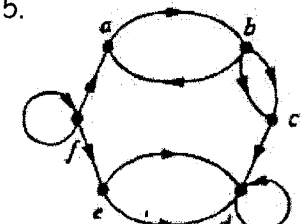
multigraph

3. 

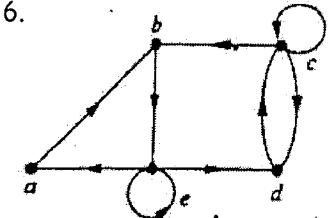
pseudograph

4. 

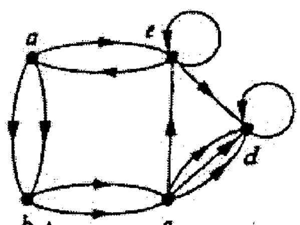
multigraph

5. 

directed multigraph

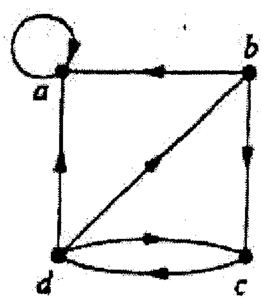
6. 

directed multigraph

7. 

directed multigraph

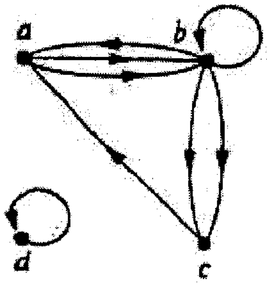
Complete the chart and information for each graph.

8. 

\# of vertices = 4 # of edges = 7

vertex	in-degree	out-degree
a	3	1
b	1	2
c	2	1
d	1	3

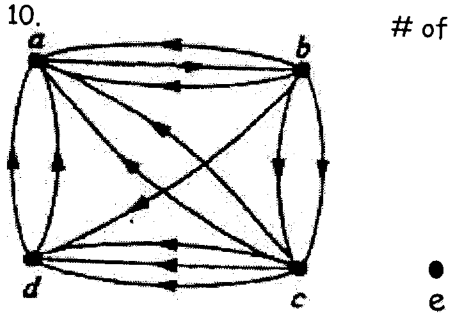
sum of the in-degree = 7 sum of the out-degree = 7

9. 

\# of vertices = 4 # of edges = 8

vertex	in-degree	out-degree
a	2	2
b	3	4
c	2	1
d	1	1

sum of the in-degree = 8 sum of the out-degree = 8

10. 

\# of vertices = 5 # of edges = 13

vertex	in-degree	out-degree
a	6	1
b	1	5
c	2	5
d	4	2
e	0	0

sum of the in-degree = 13 sum of the out-degree = 13

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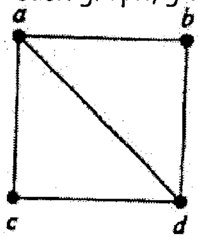
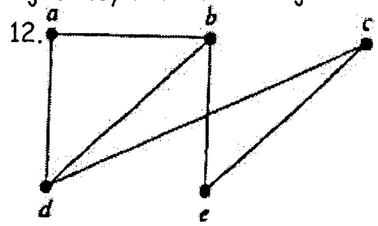
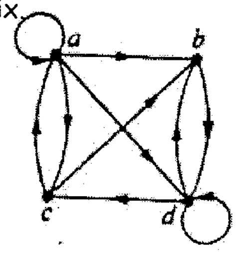
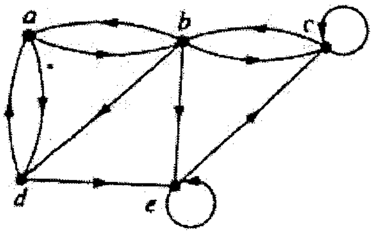
(see next page for answers)

For each graph, give an adjacency list and an adjacency matrix.

11. 

12. 

13. 

14. 

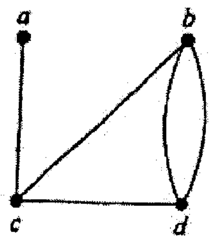
Draw a directed graph with the given adjacency matrix.

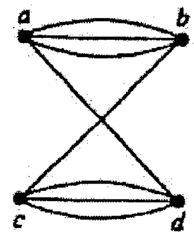
15. $\begin{bmatrix} 0 & 1 & 0 \\ 1 & 0 & 1 \\ 0 & 1 & 0 \end{bmatrix}$

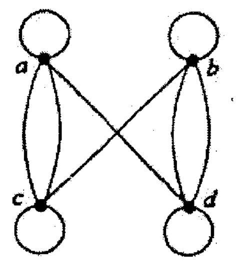
16. $\begin{bmatrix} 0 & 0 & 1 & 1 \\ 0 & 0 & 1 & 0 \\ 1 & 1 & 0 & 1 \\ 1 & 1 & 1 & 0 \end{bmatrix}$

17. $\begin{bmatrix} 1 & 1 & 1 & 0 \\ 0 & 0 & 1 & 0 \\ 1 & 0 & 1 & 0 \\ 1 & 1 & 1 & 0 \end{bmatrix}$

Represent each undirected graph with an adjacency matrix.

18. 

19. 

20. 

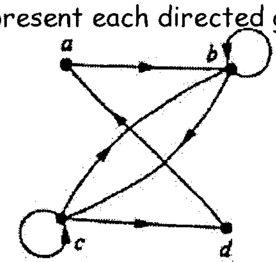
Draw an undirected graph represented by the given adjacency matrix.

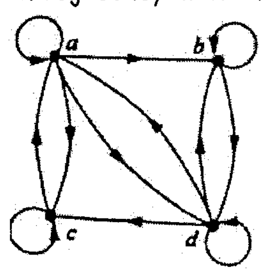
21. $\begin{bmatrix} 1 & 3 & 2 \\ 3 & 0 & 4 \\ 2 & 4 & 0 \end{bmatrix}$

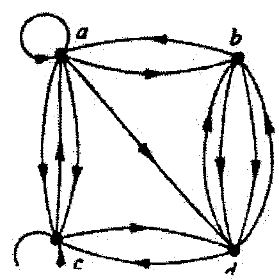
22. $\begin{bmatrix} 1 & 2 & 0 & 1 \\ 2 & 0 & 3 & 0 \\ 0 & 3 & 1 & 1 \\ 1 & 0 & 1 & 0 \end{bmatrix}$

23. $\begin{bmatrix} 0 & 1 & 3 & 0 & 4 \\ 1 & 2 & 1 & 3 & 0 \\ 3 & 1 & 1 & 0 & 1 \\ 0 & 3 & 0 & 0 & 2 \\ 4 & 0 & 1 & 2 & 3 \end{bmatrix}$

Represent each directed graph with an adjacency matrix.

24. 

25. 

26. 

Draw the directed graph represented by the given adjacency matrix.

27. $\begin{bmatrix} 1 & 0 & 1 \\ 0 & 0 & 1 \\ 1 & 1 & 1 \end{bmatrix}$

28. $\begin{bmatrix} 1 & 2 & 1 \\ 2 & 0 & 0 \\ 0 & 2 & 2 \end{bmatrix}$

	vertex	adjacent to
11.	a	b, c, d
	b	a, d
	c	a, d
	d	a, b, c

$$\begin{bmatrix} 0 & 1 & 1 & 1 \\ 1 & 0 & 0 & 1 \\ 1 & 0 & 0 & 1 \\ 1 & 1 & 1 & 0 \end{bmatrix}$$

12.	a	b, d
	b	a, d, e
	c	d, e
	d	a, b, c
	e	b, c

$$\begin{bmatrix} 0 & 1 & 0 & 1 & 0 \\ 1 & 0 & 0 & 1 & 1 \\ 0 & 0 & 0 & 1 & 1 \\ 1 & 1 & 1 & 0 & 0 \\ 0 & 1 & 1 & 0 & 0 \end{bmatrix}$$

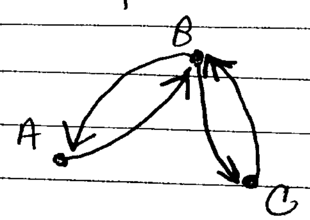
13.	a	a, b, c, d
	b	d
	c	a, b
	d	a, b, c

$$\begin{bmatrix} 1 & 1 & 1 & 1 \\ 0 & 0 & 0 & 1 \\ 1 & 1 & 0 & 0 \\ 1 & 1 & 1 & 0 \end{bmatrix}$$

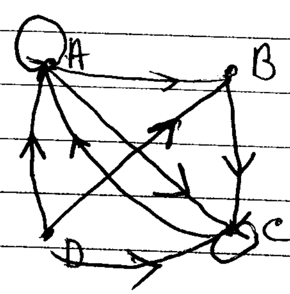
14	a	b, d
	b	a, c, d, e
	c	b, c
	d	a, e
	e	c, e

$$\begin{bmatrix} 0 & 1 & 0 & 1 & 0 \\ 1 & 0 & 1 & 1 & 1 \\ 0 & 1 & 1 & 0 & 0 \\ 1 & 0 & 0 & 0 & 1 \\ 0 & 0 & 1 & 0 & 1 \end{bmatrix}$$

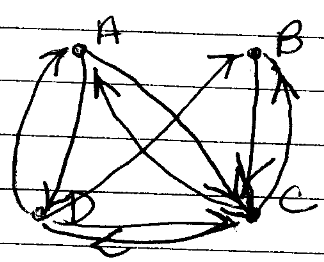
15.



17.



16.

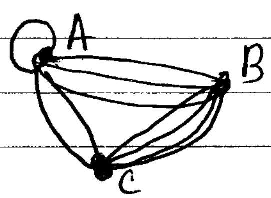


18. $\begin{bmatrix} 0 & 0 & 1 & 0 \\ 0 & 0 & 1 & 2 \\ 1 & 1 & 0 & 1 \\ 2 & 2 & 1 & 0 \end{bmatrix}$

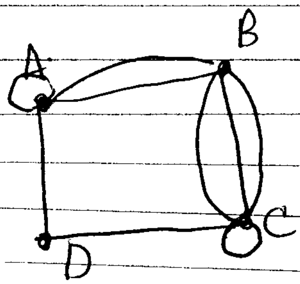
19. $\begin{bmatrix} 0 & 3 & 0 & 1 \\ 3 & 0 & 1 & 0 \\ 0 & 1 & 0 & 3 \\ 1 & 0 & 3 & 0 \end{bmatrix}$

20. $\begin{bmatrix} 1 & 0 & 2 & 1 \\ 0 & 1 & 1 & 2 \\ 2 & 1 & 1 & 0 \\ 1 & 2 & 0 & 1 \end{bmatrix}$

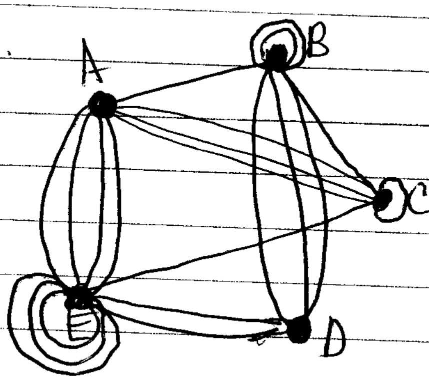
21.



22.



23.

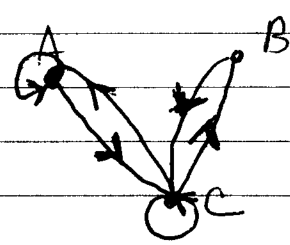


24. $\begin{bmatrix} 0 & 1 & 0 & 0 \\ 0 & 1 & 1 & 0 \\ 0 & 1 & 1 & 1 \\ 1 & 0 & 0 & 0 \end{bmatrix}$

25. $\begin{bmatrix} 1 & 1 & 1 & 1 \\ 0 & 1 & 0 & 1 \\ 1 & 0 & 1 & 0 \\ 1 & 1 & 1 & 1 \end{bmatrix}$

26. $\begin{bmatrix} 1 & 1 & 2 & 1 \\ 1 & 0 & 0 & 2 \\ 1 & 0 & 1 & 1 \\ 0 & 2 & 1 & 0 \end{bmatrix}$

27.



28.