1. a) The table below lists all vertices at distance 0, 1, and 2 from b:

0	1	2
		a
	e	
b		d
	c	
		f

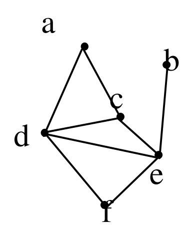
There is one way of listing the paths of length 1, two ways - the paths of length 2, and 3 ways - the paths of length 3. Therefore there are 12 possible breadth-first traversals starting in b:

becadf, becafd, becdaf, becdfa, becfad, becfda,
bceadf, bceafd, bcedaf, bcedfa, bcefad, bcefda

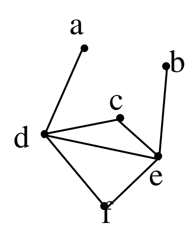
b) bcadef, bcadfe, bcdaef, bcdafe, bcdefa, bcdfea, bcedaf, bcedfa, bcefda
becadf, becdaf, becdfa, bedacf, bedcaf, bedfca, bedfac, befdac, befdca

2. Yes, because all vertices are of even degree.

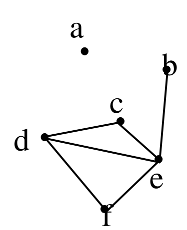
bc



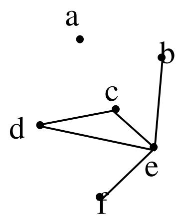
bca



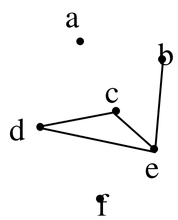
bcad



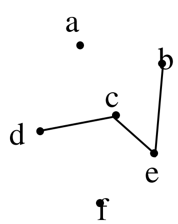
bcadf



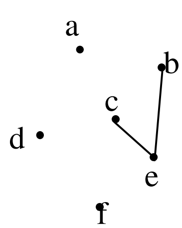
bcadfe



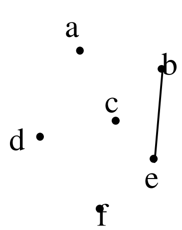
bcadfed



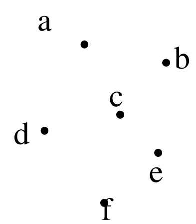
bcadfedc



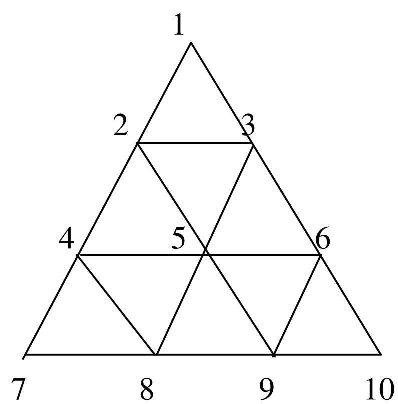
bcadfedce



bcadfedceb



3. Yes, because all vertices are of even degree.



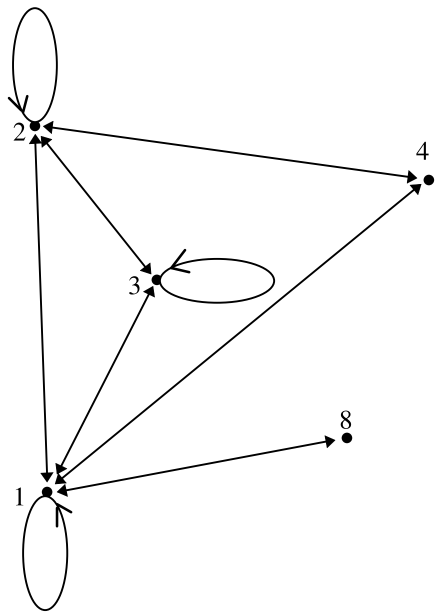
1 2 3 5 2 4 5 6 9 5 8 4 7 8 9 10 6 3 1

4. a) { <1,1>,<1,2>,<1,3>,<1,4>,<1,8>,
<2,1>,<2,2>,<2,3>,<2,4>,
<3,1>,<3,2>,<3,3>,
<4,1>,<4,2>,
<8,1> }

b)

	1	2	3	4	8
1	1	1	1	1	1
2	1	1	1	1	0
3	1	1	1	0	0
4	1	1	0	0	0
8	1	0	0	0	0

c)



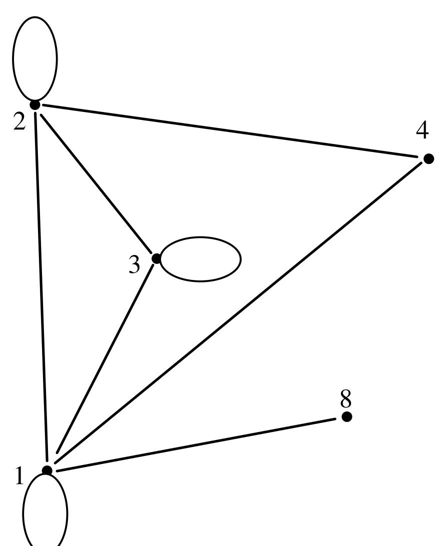
d) No

e) No

f) ex. 1 4 2 3

g) ex. 1 8 4 1

5.



a) deg(1)=6

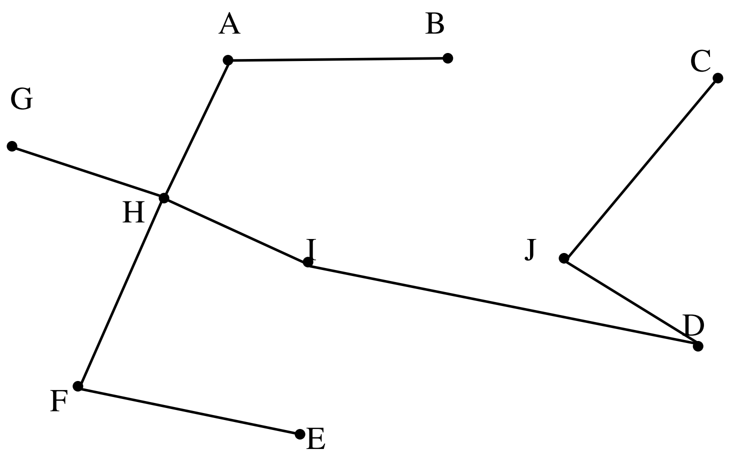
deg(2)=5
deg(3)=4
deg(4)=2
deg(8)=1

b) No

c) Yes, 8 1 1 2 2 4 1 3 3 2

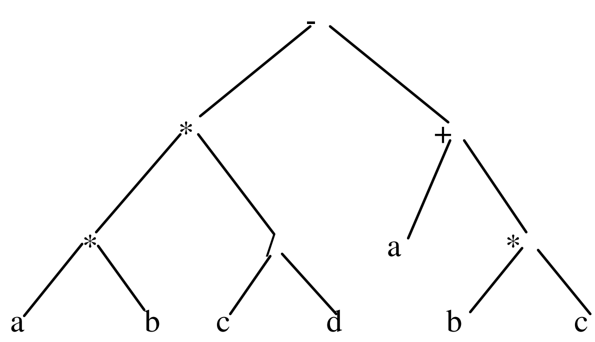
d) No

6.



The cost of the upgrade is 21.1.

7. a)



b) <-,<*,<*,<a>,<b>>,</,<c>,<d>>>>,<+,<a>,<*,<b>,<c>>>>