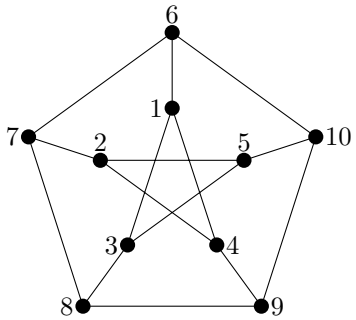
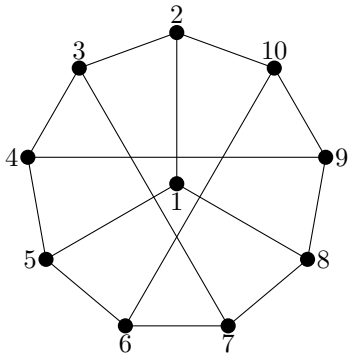
CS251 homeowrk 6

name:_____

Due: 12/3/19

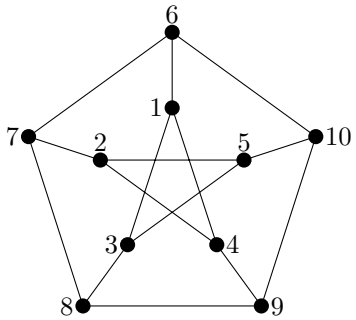
1. The table provides a function that defines an isomorphism between the graphs.





Left	**Right**
1	6
2	3
3	5
4	7
5	4
6	10
7	2
8	1
9	8
10	9

2. The table provides a 3 coloring of the graph using the colors a, b, and c.
   The chromatic number cannot be 2 because C_5 is a subgraph.



Vertex	**Color**
1	a
2	c
3	c
4	b
5	b
6	b
7	a
8	b
9	c
10	a

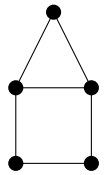
3. Given the prolog program

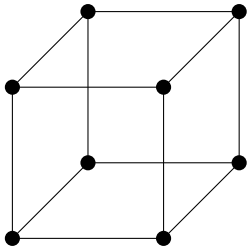
```
p :- a, b, c.
a :- b, d.
a :- b, e.
b :- x.
b :- y.
c.
y.
d :- x.
e.
```

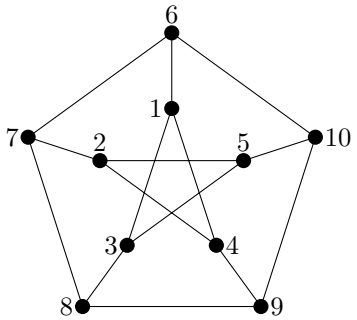
   Use SLD resolution to evaluate the query

```
?- p.
```

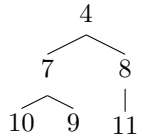
4. For each of the following graphs,
   (a) Number the vertices.
   (b) Make an edge list.
   (c) Make an adjacency list.
   (d) Make an adjacency matrix.







5. Given the heap



Perform the following operations. After each one, draw the heap, and write out the array representing the heap.

(a) push(5)

(b) pop

(c) push(3)

(d) pop

6. Prove that if a graph contains no odd cycles, then it is bipartite.

7. Prove that if a graph has an Eulerian circuit, then all of the vertices have even degree.

8. Prove Euler's formula $V - E + F = 2$ for planar graphs.
   Here's a fun youtube video
   `https://www.youtube.com/watch?v=-9OUyo8NFZg`
   Here's another fun, but maybe less relevant, video)
   `https://www.youtube.com/watch?v=6bWJu8DvFMk`

9. run depth first search, breadth first search, and Dijkstra's on the following graph. When picking which vertex to look at next, pick the next vertex alphabetically.