1. Some of the graphs are directed because you will never go back up the branches of the tree. With other non-directional graphs there is a possibility you may have to walk backward through the branches in order to reach your next state. If you were to draw a graph of roads between cities they would be undirected. This is because a majority of roads are two way, if every single road in that city was one way only I would draw it as a directional graph, but this city is more than likely not Latrobe, PA so the street system should make at least some sense!

2. A, B, E, F, G, C, D, H

3. A, B, C, D, E, F, G, H

4. Depth first search will not find the shortest path to the goal, breadth first search will though.

5. 1 - A, B, C, D
   2 - A, B, E, A, B, F, A, C, G (Found the goal state, die)

6. A, B, E, F, G

7. $Nodes = \frac{BF^{(\mathrm{Depth}+1)}-1}{BF-1}$
   $Nodes = \frac{20^{(50+1)}-1}{20-1}$
   $Nodes = 1.1851577966764*10\text{^}65$

8. 2

9. MIA

10. MIA

11. MIA

12. MIA

13. For the A* algorithm to be admissible its estimated solution must be less than the actual distance to the solution. For example, if the algorithm estimated a distance of 5 nodes to the solution when it was actually 7, it would be admissible. On the contrary if the estimation was 8 nodes when the actual distance was 7, the algorithm would not be admissible.

14. MIA
15. In the case of figure 3 this modification to the A* algorithm will always reach the shortest path. In many cases this would not be true, but in this specific case there is only one path to the solution, making the shortest path the only path.