**Part 1: Graph Theory and Constraint Satisfaction Problem**

**(a) Question 1**

1. **Domain** is a set of possible values that a variable can take. There are 3 types of domains: Discrete finite domain, infinite domains and continuous domains.
2. **Variable** Is used to describe an entity in an environment. A variable is dynamic in nature as it can change to any value in the variable’s domain
3. **Constraints** are limitations to the variables which essentially narrow down the domain size of that variable.
4. **State** is the combination of multiple variables
5. **Forward checking** is a filtering process that eliminates inconsistent values in the domains of variables that are related to the specific variable that has been assigned a value. This has the purpose of detecting failures. If there is no value that does not violate the constraints, the forward checking will conclude that the assigned variable will not have a solution and hence it will backtrack and assign that variable a different vale.
6. **Backtracking** Is a search algorithm in constraint satisfaction problems which is similar to depth first search, the algorithm follows one branch and at each depth if the constraint is violated, the algorithm goes back one step and assigns a different value in order to expand a different path.
7. **Arc consistency** occurs when two variables have consistent values related to each other, in other words, the values in the first variable obey binary constraints with respect to the second variable.
8. **Constraint graphs** are used to visualize constraint satisfaction problems. The graph consists of variables represented as nodes and relationships between variables represented as links.
9. **Most constrained variable** is a variable that has the fewest values it can take in its domain.
10. **Least-constraining value** is used for ordering values of variables in a backtracking search, this ordering methods eliminates the value which has the smallest domain for the remaining unassigned variables.

**(b) Question 2**