

# Assignment #1

## Graph Theory

**Issue Date:** 25<sup>th</sup> February, 2017

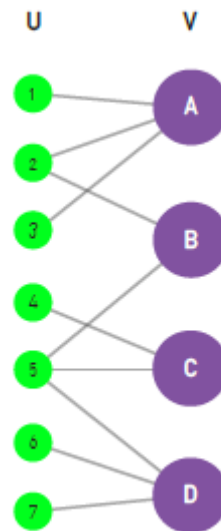
**Due Date:** 8<sup>th</sup> March, 2017

**Q1. [5 points]** Write about one network of your interest and address following questions:

- What are its nodes and links?
- How large is it?
- Can be mapped out?
- Why do you care about it?

**Q2. [10 points]** You are provided a bipartite graph. Generate uni-partite graph on project of V

- Section 2.7 of book “Network Science” by Albert Barabasi



**Q.3. [5 points]** There are two social networks modelled as simple, unidirectional graphs, where the average degree is the same (approximately) but both have different network density. What does it mean, if any, in terms of (i) number of nodes (ii) number of edges?

**Q.4. [10 points]** Draw the acquaintanceship graph that represents that Ali and Parveen, Ali and Jamil, Ali and Sana, Ali and Any, Ali and Mehwish, Javed and Parveen, Javed and Moona, Parveen and Jamil, Any and Jamil, and Any and Mehwish know each other, but none of the other pairs of people listed know each other.

- Determine average degree for each node
- Determine clustering coefficient for each node
- Draw degree distribution for the graph

**Q.5. [10 points]** Construct an influence graph for the board members of a company if the President can influence the Director of Research and Development, the Director of Marketing, and the Director of Operations; the Director of Research and Development can influence the Director of Operations; the Director of Marketing can influence the Director of Operations; and no one can influence, or be influenced by, the Chief Financial Officer.

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- Draw degree distribution for the graph