1. (30%) Consider a sequence of keys: 4, 6, 13, 16, 5, 8, 15, 19. Please draw the result by inserting these keys into empty
   a) B-tree
   b) AVL-tree
   c) 2-3 tree
2. (20%) Propose a linked list to represent the polynomials in several variables. Show the representation of the following polynomials f and g in linked list and write a program to perform multiplication of these polynomials in C language.
   \[ f = 3x^5 + 5x^3y^2 - x^3y^2 \]
   \[ g = 2x^3y^2 - 7x^2y^3 + 10xy^5 \]
3. (10%) Construct the max heaps by the following data in the given order: 38, 72, 67, 41, 39, 72, 37, 25, 66, 73.
4. (20%) According to the list (37, 41, 19, 81, 41, 25, 56, 61, 49). Show the status of the list at the end of each phase of
   a) Quick sort
   b) Shell sort
5. (20%) Find a minimum spanning tree for the following graph using both Prim’s and Kruskal’s algorithms.