Mathematics for Computer Science, CM0167,
Example class, Week 7,
Dr David Marshall

1. Consider the following table of average capacities of communication links
   in a computer network:

Vertices	1	2	3	4	5	6	7
1	–	5	–	2	–	–	–
2	4	–	2	3	–	–	–
3	–	3	–	–	–	3	–
4	2	5	–	–	1	–	–
5	–	–	–	3	–	4	5
6	–	–	3	–	4	–	2
7	–	–	–	–	4	2	–

   (a) Represent the above table as *digraph* of the computer network?

   (b) Using *Djikstra's algorithm*, Find the shortest path from vertex 1 to
       all other vertices. Express your solution as a shortest path tree.

   (c) Write down the *routing table* for vertex 1.

   (d) Do the same as (a), (b) and (c) for vertex 2 *etc.*

   (e) Suppose the delay weight for vertex 2 to vertex 4 decreases from 3 to
       1. How does this change the shortest path tree for vertex 2?

   (f) If the links between vertex 5 and 6 go down what happens to the
       shortest path trees and routing tables for vertices 1 and 2?

2. We are given a sample of size 15 about the load of stock funds. The
   sample is

   (0%, 3%, 4%, 2%, 2%, 1%, 0%, 1%, 4%, 1%, 2%, 0%, 1%, 2%, 2%)

   a) Draw a vertical bar graph, a horizontal bar graph and a circle
      diagram of the sample.

   b) Calculate the absolute and relative frequency of each load.