# COMPSCI 314 S1T Assignment 3
# 2008


## Department of Computer Science
## The University of Auckland

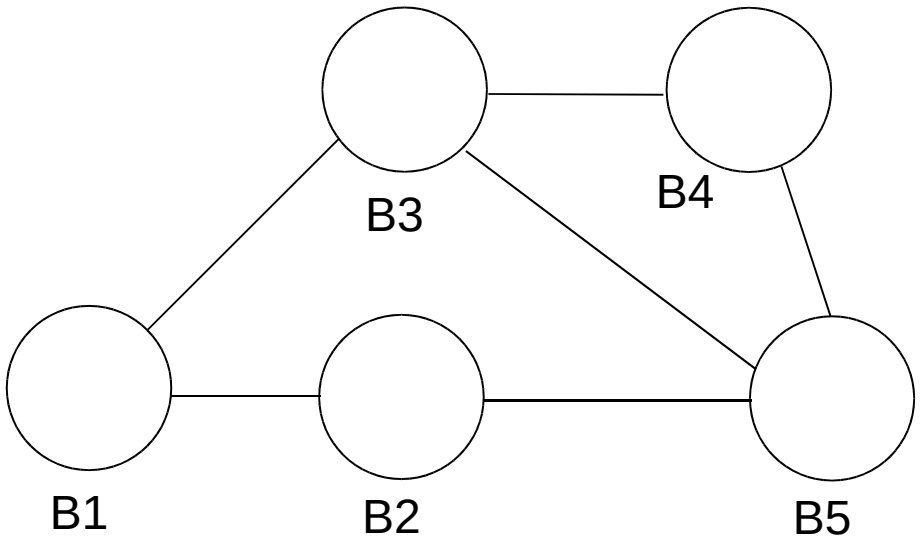

*This assignment contributes **5%** of your overall course mark. Submit your assignment in **PDF** format to the **Assignment Drop Box**. Include all **workings** and **explanations**. Marks will be deducted for ambiguous solutions. Zero marks are awarded if the answers contain no explanation. Also, refer to the Departmental Policy on Cheating on Assignments.*

***Assignment Drop Box** (https://adb.ec.auckland.ac.nz/adb/).*
***Departmental Policy on Cheating on Assignments** (http://www.cs.auckland.ac.nz/CheatingPolicy.php)*

**[Total: 40 marks]**

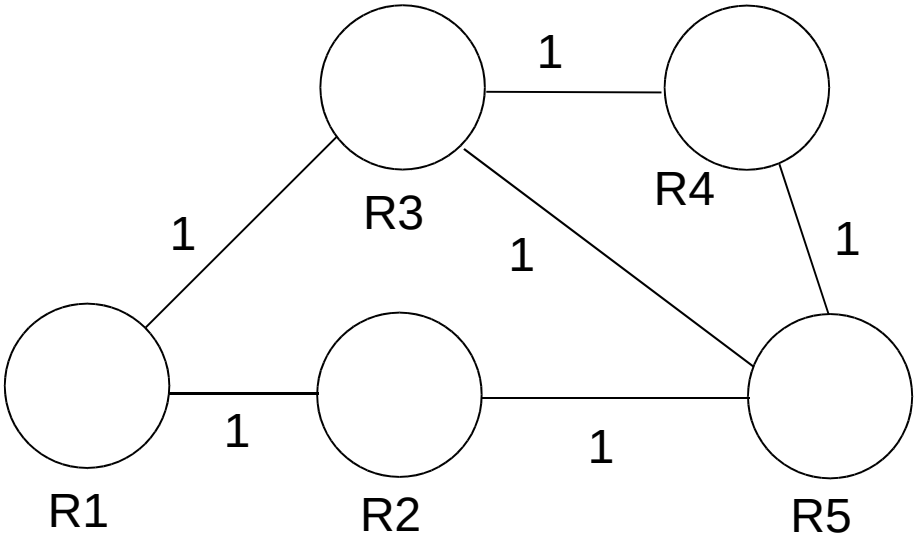
**Q1. Bridging and routing [20 marks]**

a) Consider the following network of LAN bridges (in practice, these would be multiport switches, with only the links *between* switches shown).




Assume B1 is elected as the root bridge. Assuming the link metrics are all the same, list the links in a valid spanning tree (e.g. B1-B2, etc.). Which link(s) will not be used? **[4 marks]**

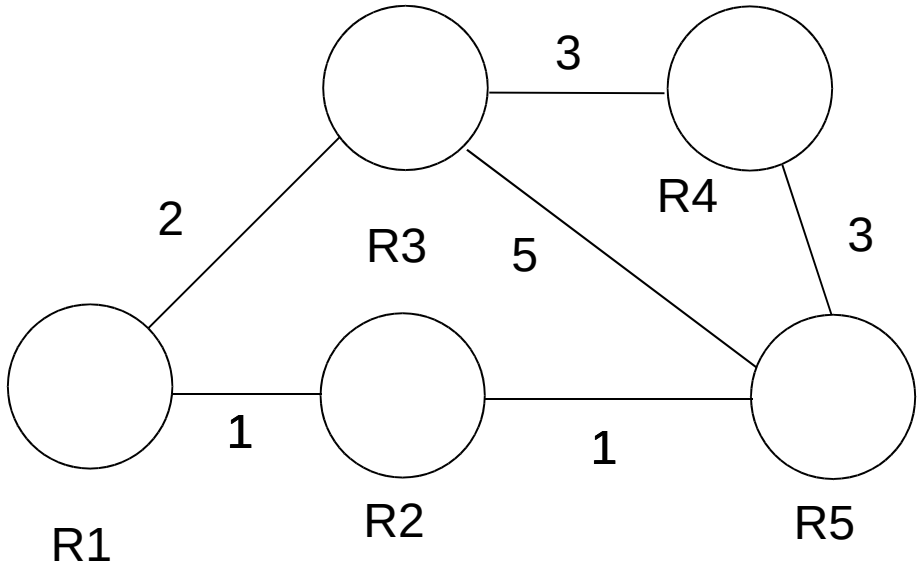
b) Consider the following network of routers, where all the paths have equal weight (1).




List the shortest distances from **R1** to each other R, as the Dijkstra (shortest path first) algorithm would find them. Then repeat for the distances from **R5** to each other R. **[4 marks]**

c) What will change if the link between R3 and R4 stops working? **[4 marks]**

d) Repeat part b) but with different weights on the links, as shown below. **[4 marks]**




e) What will change this time, if the link between R3 and R4 stops working? **[4 marks]**

**Q2. IP fragmentation [20 marks]**

a) Explain briefly what is meant by 'fragmentation and reassembly' of IP packets. **[2 marks]**

b) List and explain the fields in the IPv4 header that are used to implement fragmentation. [**3 marks]**

c) How does a host know that an incoming Ipv4 packet contains a fragment? **[2 marks]**

d) Why are IPv4 fragment offsets specified in 8-byte units? **[3 marks]**

e) Assume that you are attempting to send a large IPv4 packet (6000 bytes in size including 20 bytes IP header) to an Ethernet switch that has 2000 MTU. How many IP fragments would you need to send? Assume Ethernet header/trailer size is 18 bytes. Also, how would that affect the link's effective data transport rate? **[6 marks]**

f) In IPv6, what devices perform fragmentation? How does a fragment appear in an IPv6 packet? **[2 marks]**

g) Give one advantage and one disadvantage of the IPv6 approach to fragmentation. **[2 marks]**

---