

## Assignment 4

Due Tuesday, April 28. Show your work. Hand in your assignment using the appropriate dropbox on the course web site. Assignments submitted after the solutions are made available will be given a mark of zero.

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### Question 1

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Assume a network's routers have been configured to calculate the "cost" of a link (path) for routing purposes as  $10^8/R$  where  $R$  is the link data rate in bits/second.

If the cost must be represented as an unsigned 16-bit integer what are the highest and lowest costs that can be represented? What are the corresponding data rates?

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### Question 2

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For each of the following IP hosts look up the/an IP address (e.g. using nslookup), the corresponding network in CIDR notation (e.g. using whois.arin.net) and the corresponding ASN (you can use the website's "Organization" link to look up the "related" ASNs):

- (a) wikipedia.org
- (b) netflix.com
- (c) sfu.ca

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### Question 3

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Classify each of the following as an intra-domain (interior) or exterior routing protocol: RIPv2, OSPF, BGP, EIGRP. Which of these would have to be implemented in the router that connected BCIT's internal network to the internet?

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### Question 4

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The following bytes (in decimal) appear in the options field of a DHCP message. How many options are there? What are their types, lengths and values in

decimal? What what is the name of each option (according to RFC 2132)? What is the human-readable value of each field?

26 2 6 4 215 1 32 12 2 72 105 255

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### Question 5

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You need to configure the DNS server for a new domain called notbcit.ca. It has only one actual host whose name is server.notbcit.ca with an IP address 142.232.1.22. This machine is also the name server for the domain. The host names notbcit.ca and www.notbcit.ca should both resolve to a CNAME record pointing to that one host. Mail for this domain should be handled by the host smtp.google.com.

Assuming an SOA record for notbcit.ca has already been written, give the A, NS, CNAME and MX resource records for this domain in BIND format. Use default TTL values and specify a priority value of 10 for the MX record.

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### Question 6

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How many name servers would have to be contacted by a recursive DNS server to find the IP address of the host www.ece.ubc.ca starting at the root of the DNS hierarchy ("")?

Use the nslookup (or dig) commands to find their host names and IP addresses. For example, the first two lookups for google.com would be:

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nslookup -type=ns .
nslookup -type=ns com a.root-servers.net.
```

When queries returns multiple results, choose one at random.

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## Question 7

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Generate a random IP address by squaring the last five digits of your student number and using the first (most significant) four pairs of digits in the result. For example, if your student number was 123456 the IP address would be  $23456^2 = 550183936$  and the IP address would be 55.01.83.93.

Give the nslookup command that you would use to look up the host name corresponding to this IP address. If you get a result, give the host name and the result of looking up the IP address for this host name. If not, square your previous value and try again using the first four pairs of numbers of that result. If necessary, repeat until you get an IP address that has a host name in the DNS.

Note that the order of the bytes in the host name you look up is reversed from the order of the bytes in the IP address.