I Warmup

1. [4 points]: Which of the following is true about Address Resolution Protocol (ARP) and learning bridges?

(Circle ALL that apply)

A. A learning bridge maintains state that maps IP addresses to hardware (MAC) addresses.

B. A learning bridge maintains state that maps IP addresses to MAC addresses.

C. A host's ARP table maintains state that maps IP addresses to hardware (MAC) addresses.

D. A host's ARP table maintains state that maps hardware addresses to IP addresses.

2. [4 points]: Which of the following can an AS use in its route advertisements to indicate to a neighboring "backup" upstream AS to tell the backup AS to send it traffic through a different "primary" AS (as opposed to sending it traffic directly)?

(Circle ALL that apply)

A. the BGP "community" attribute

B. Multiple exit discriminator

C. Local preference

D. AS path prepending

E. All of the above

3. [4 points]: Which of the following is true about DNS?

(Circle ALL that apply)

A. A query for an `A` record may return multiple IP addresses in the response.

B. A query for an `NS` record may return multiple IP addresses in the response.

C. A query for a `MX` record may return multiple IP addresses in the response.

D. A short TTL on an `A` record reply may run the risk of increasing traffic at the root nameserver.

E. None of the above.

4. [2 points]: Which of the following most accurately describes the *most common* uses for eBGP, iBGP, and IGP?

(Circle the BEST answer)

A. eBGP is used between ASes for external destinations, iBGP is used within an AS for external destinations, and IGP is used within an AS for destinations within an AS.

Name:

B. eBGP is used within an AS for external destinations, iBGP is used between ASes for external destinations, and IGP is used within an AS for internal destinations.

C. eBGP is used between ASes for external destinations, iBGP is used within an AS for internal destinations, and IGP is used within an AS for external destinations.

D. None of the above

Name:

II Potpourri

5. [4 points]: Explain the difference between a link-state routing protocol an a distance vector protocol.

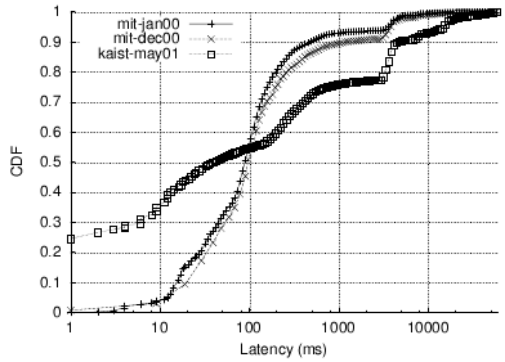
(Answer legibly in the space below.)

6. [4 points]: Consider the graph below, which shows a cumulative distribution function (CDF) of the DNS response times for DNS lookup latencies for three data traces: (1) two different traces at a resolver at MIT in Cambridge, MA; (2) one trace at a resolver in Korea (`kaist`). [1]

A. Which resolver has more queries that take more than a second to resolve?

B. Why might the two traces have different latency distributions? (In other words, why might one resolver take longer to resolve queries than another?) There are several possible reasons; give one. (*Hint:* Think about geography.)

(Answer legibly in the space below.)



[1] In case you don't know, the way to read a CDF is as follows: a point (x, y) means that for that distribution, the fraction y of the points in that distribution have value x or smaller. For example, slightly more than 30% of the queries in the `kaist` trace had a lookup latency of 10ms or less.

Name:

7. [5 points]: In his paper, *The Design Philosophy of the DARPA Internet Protocols*, Clark explains how fate-sharing allows the network architecture to survive failures. (1) Explain how storing connection state information at end hosts constitutes fate sharing. (2) Does the 4D architecture of separating the control plane from the data plane violate fate sharing? Why or why not?

(Answer legibly in the space below.)

8. [3 points]: Describe the *end-to-end argument*. Give one example of a network protocol or technology that violates the end-to-end argument (and explain the violation).

(Answer legibly in the space below.)

Name:

III Internet Measurement

Note: We have not covered this topic yet, so you need not answer it. I have included it here as an example of a question that asks you to *apply your knowledge*. Notice that it's a question that is not pure regurgitation. You can expect something like this on the quiz.

9. [6 points]: Suppose that you would like to measure the downstream throughput for an access link for which you do not have direct access. You have access to servers on the Internet and can "ping" the router that is on the downstream side of the access link, but you don't have direct access to either the router, or any devices downstream from the access router. Design a probing scheme that you could send from servers on the Internet to estimate the downstream throughput of the access link. State your assumptions and possible sources of inaccuracy.

(Answer legibly in the space below.)

Name: