Feedback — Final Exam

You submitted this exam on **Fri 29 Mar 2013 11:34 PM EDT -0400**. You got a score of **46.00** out of **60.00**.

There are 60 points in this exam. Duration is 3 hours.

Question 1

(2 points) How many distinct IPv4 addresses are there?

Your Answer		Score	Explanation
◉ 2^{32}	✓	2.00	
○ 2^{16}			
○ 2^{48}			
○ 2^{64}			
Total		2.00 / 2.00	

Question Explanation

2^{32}

Question 2

(2 points) In principle, what is the maximum number of distinct TCP endpoints that could concurrently be listening for arriving connections on the IPv4 Internet? (i.e., what is the maximum number of servers that could be concurrently reachable on the Internet?) Hint: the number of bits in the port field of the TCP header is 16.

Your Answer		Score	Explanation
◉ 2^{48}	✓	2.00	
○ 2^{64}			
○ 2^{16}			
○ 2^{32}			
Total		2.00 / 2.00	

Question Explanation

2^{48}

Question 3

(2 points) If TCP observes a packet drop (from a timeout), what does it assume has happened?

Your Answer		Score	Explanation
◉ network congestion caused the packet to be dropped from a router queue	✓	2.00	
○ none of the rest			
○ its retransmission timer is set too low (the timer fired too soon)			
○ its retransmission timer is set too high (the timer fired too late)			
Total		2.00 / 2.00	

Question Explanation

network congestion caused the packet to be dropped from a router queue

Question 4

(2 points) Which one of the following statements is false?

Your Answer		Score	Explanation
◉ none of the rest	✓	2.00	
○ a single program can listen on more than one TCP port			
○ a single computer can have more than one IP address			
○ a single IP address can have more than one DNS name			
Total		2.00 / 2.00	

Question Explanation

none of the rest

Question 5

(2 points) What is the ideal window size for a TCP connection to operate at, assuming there is no competing traffic, in order to maximize network utilization?

Your Answer		Score	Explanation
○ the bandwidth-delay product of the path			
○ 100 bytes			
◉ the congestion window size	✗	0.00	
○ the receiver-advertised window size			
Total		0.00 / 2.00	

Question Explanation

the bandwidth-delay product of the path

Question 6

(2 points) Which one of the following is not a problem caused by IP fragmentation?

Your Answer		Score	Explanation
◉ applications must be modified in order to behave correctly	✓	2.00	
○ increased loss probability for the originally sent IP packet			
○ additional computational overhead at routers			
○ additional buffering requirements at end-systems for reassembly			
Total		2.00 / 2.00	

Question Explanation

applications must be modified in order to behave correctly

Question 7

(4 points) For problems 7-12,

Consider a network path with a 100ms round-trip time between hosts A and B. At time t1, host A establishes a new TCP connection to host B and then sends 60,000 bytes of data to it, with the last byte of data arriving at B at time t2. Assume each TCP packet can carry 1500 bytes of TCP data in its payload. For this question, ignore header

overhead and transmission delay. Also, you may assume that the receiver advertised window size is sufficiently large so as to not impact the sender.

What is the time at which the first data packet is sent from host A to host B? (Let this be t3.)

Your Answer		Score	Explanation
◉ t1 + 100 ms	✓	4.00	
○ t1 + 200 ms			
○ t1			
○ t1 + 150 ms			
Total		4.00 / 4.00	

Question Explanation

t1 + 100 ms

Question 8

(4 points) Assume there are no packet losses. After A sends the first data packet, how long does it take for A to transmit all of the packets and receive acknowledgements for them? In other words, what is t2 - t3? (Note that 60,000 bytes is 40 packets.)

Your Answer		Score	Explanation
◉ 6 RTTs (or 600 ms)	✓	4.00	
○ 40 RTTs (or 4000 ms)			
○ 1 RTT (or 100 ms)			
○ 7 RTTs (or 700 ms)			
○ 5 RTTs (or 500 ms)			

Total		4.00 / 4.00

Question Explanation

6 RTTs (or 600 ms)

Question 9

(4 points) What is the average data throughput delivered between times t1 and t2? (Again assume no packet loss.)

Your Answer		Score	Explanation
○ 85,714 bytes/sec			
○ 15,000 bytes/sec			
○ 300,000 bytes/sec			
◉ 100,000 bytes/sec	✗	0.00	
Total		0.00 / 4.00	

Question Explanation

85,714 bytes/sec

Question 10

(4 points) Now consider the same setting, but assume that the eighth data packet sent by A is dropped. Also assume that TCP is using neither fast retransmit nor fast recovery; it just uses a timeout to detect the packet loss. After A detects this loss, how does it update the cwnd and ssthresh values for the transfer?

Your Answer		Score	Explanation
◉ ssthresh = 4, cwnd = 1	✓	4.00	

ssthresh = 4, cwnd = 4			
ssthresh = 8, cwnd = 8			
ssthresh = 8, cwnd = 4			
Total		4.00 / 4.00	

Question Explanation

ssthresh = 4, cwnd = 1

Question 11

(4 points) Once again assume that the eighth data packet sent by A is dropped. Assume that TCP is now using both fast retransmit and fast recovery. Let the retransmission timer be set to 2RTT. Given these settings and assuming that the eight data packet was first transmitted at t3, when is the eight packet retransmitted?

Your Answer		Score	Explanation
t3 + RTT			
t3 + 4RTT			
t3 + 2RTT	✗	0.00	
t3 + 3RTT			
Total		0.00 / 4.00	

Question Explanation

t3 + RTT

Question 12

(4 points) Once again assume that TCP is using both fast retransmit and fast recovery. After the sender detects the loss of the eight packet, how does it update the cwnd and ssthresh values for the transfer?

Your Answer		Score	Explanation
◉ ssthresh = 4, cwnd = 4	✓	4.00	
○ ssthresh = 8, cwnd = 4			
○ ssthresh = 8, cwnd = 8			
○ ssthresh = 4, cwnd = 1			
Total		4.00 / 4.00	

Question Explanation

ssthresh = 4, cwnd = 4

Question 13

(5 points) A router has computed the following paths:

- packets to prefix 57.6.0.0/23 are sent through line 1
- packets to prefix 57.6.2.0/23 through line 2
- packets to prefix 57.6.4.0/24 through line 3
- packets to prefix 57.6.5.0/24 through line 1
- packets to prefix 57.6.6.0/23 through line 3

Which of the following is not a valid routing table configuration given these paths?

Your Answer		Score	Explanation
◉ Route to 57.6.0.0/21 through line 1, route to 57.6.2.0/23 through line 2, route to 57.6.4.0/22 through line 3	✓	5.00	
○ Route to 57.6.0.0/21 through line 1, route to 57.6.2.0/23 through line 2, route to 57.6.4.0/24 through			

line 3, route to 57.6.6.0/23 through line 3

○ Route to 57.6.0.0/23 through line 1, route to 57.6.2.0/23 through line 2, route to 57.6.4.0/22 through line 3, route to 57.6.5.0/24 through line 1	
○ Route to 57.6.0.0/22 through line 1, route to 57.6.2.0/23 through line 2, route to 57.6.4.0/22 through line 3, route to 57.6.5.0/24 through line 1	
Total	5.00 / 5.00

Question Explanation

Route to 57.6.0.0/21 through line 1, route to 57.6.2.0/23 through line 2, route to 57.6.4.0/22 through line 3

Question 14

(5 points) Consider a router that uses fair queueing, with three queues, for flows F1, F2, and F3 respectively. Assume that the flows are all routed through the same output port. If the router receives the following packets all at about the same time, in the order listed

- P1: 200 byte packet for F1
- P2: 200 byte packet for F1
- P3: 200 byte packet for F1
- P4: 200 byte packet for F1
- P5: 380 byte packet for F2
- P6: 400 byte packet for F2
- P7: 220 byte packet for F3
- P8: 100 byte packet for F3

Assume that the outgoing port was busy when these packets are received, but that the queues for the flows were empty to begin with. What is the order in which the packets would be transmitted?

Your Answer		Score	Explanation
◉ P1, P7, P8, P5, P2, P3, P6, P4	✓	5.00	

○ P1, P7, P2, P5, P8, P3, P6, P4	
○ P1, P5, P7, P2, P6, P8, P3, P4	
○ P1, P2, P5, P7, P3, P4, P6, P8	
Total	5.00 / 5.00

Question Explanation

P1, P7, P8, P5, P2, P3, P6, P4

Question 15

(2 points) Imagine that an application running on your home machine makes a request to the local name server to resolve the DNS name www.cs.washington.edu. How many name servers are contacted by the local name server to complete the translation? Assume the “worst case” scenario with respect to DNS caches and assume that cs.washington.edu is an independently administered zone inside washington.edu.

Your Answer		Score	Explanation
◉ 4 servers	✓	2.00	
○ 3 servers			
○ 1 server			
○ 2 servers			
Total		2.00 / 2.00	

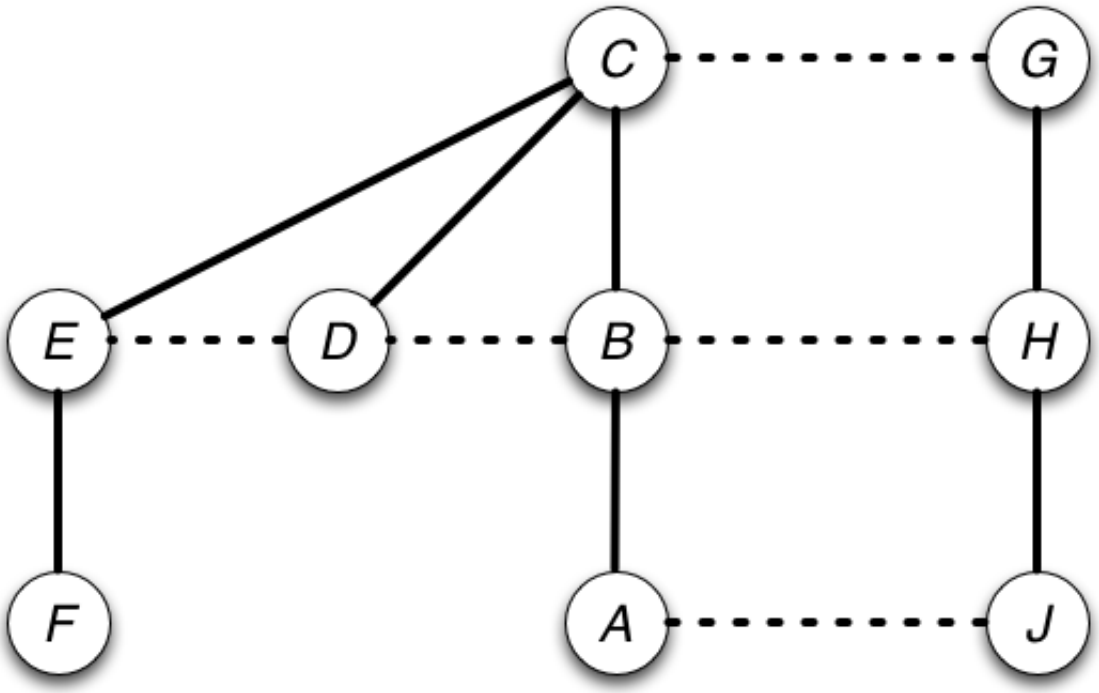
Question Explanation

4 servers

Question 16

For problems 16-18,

Consider the inter-domain topology and routing policy depicted in the following figure. A solid line indicates a transit-customer relationship (with the transit provider located above the customer and providing transit to the customer), and a dashed line indicates a peering relationship. Assume that typical BGP routing policies are used for routing between ASes.



(4 points) What is the BGP route from F to J?

Your Answer		Score	Explanation
○ F - E - C - G - H - J			
◉ No route	✗	0.00	
○ F - E - D - B - H - J			
○ F - E - D - B - A - J			
Total		0.00 / 4.00	

Question Explanation

F - E - C - G - H - J

Question 17

(4 points) What is the BGP route from F to A?

Your Answer		Score	Explanation
◉ F - E - C - B - A	✓	4.00	
○ No route			
○ F - E - D - B - A			
○ F - E - D - C - B - A			
Total		4.00 / 4.00	

Question Explanation

F - E - C - B - A

Question 18

(4 points) What is the BGP route from C to J?

Your Answer		Score	Explanation
◉ C - G - H - J	✓	4.00	
○ No route			
○ C - B - A - J			
○ C - B - H - J			

Total	4.00 / 4.00

Question Explanation

C - G - H - J