Week 8 Summary Exercises

Due Nov 24 at 11:59pm **Points** 60 **Questions** 29
Available Nov 17 at 12am - Nov 24 at 11:59pm 8 days **Time Limit** 360 Minutes
Allowed Attempts 2

Attempt History

	Attempt	Time	Score
KEPT	Attempt 2	128 minutes	60 out of 60
LATEST	Attempt 2	128 minutes	60 out of 60
	Attempt 1	279 minutes	56.6 out of 60

Score for this attempt: **60** out of 60
Submitted Nov 24 at 7:52pm
This attempt took 128 minutes.

Question 1

1 / 1 pts

The process of moving a datagram from a router's input port to output port is handled by the switching fabric .

Answer 1:

Correct!

switching fabric

Question 2

1 / 1 pts

The Internet Protocol (IP) implements data reliability services.

True

Correct!

False

Question 3

1 / 1 pts

In a link between Host A, and Host B, we have three intermediary routers:

Host A ----- Router Snucky ------ Router Jumpy ------ Router Po ------- Host B

Host A's first hop router is Router Snucky .

Answer 1:

Correct!

Snucky

Question 4

1 / 1 pts

The process of determining a path through the internet is called routing .

Answer 1:

Correct!

routing

Question 5

1 / 1 pts

A router's routing table is output by a routing algorithm .

Answer 1:

Correct!

routing algorithm

Question 6

2 / 2 pts

Upon encountering a router with the following routing table:

Prefix Match	Port
10011110 00011110 10001111	0
10011110 00011110 10001111 000	1
10011110 00011110 10001111 01	2
10011110 00011110 10001110 0001	3
Default	4

A datagram with the destination IP address 158.30.142.90 would be routed to Port 4 .

Answer 1:

Correct!

Port 4

Question 7

2 / 2 pts

For a TCP/IP datagram coming into a home network through a NAPT device, which of the following header fields (IP and/or TCP) are altered? (Check all that apply)

- [ ] Source IP Address
- [x] Header Checksum — Correct!
- [x] Destination Port — Correct!
- [ ] Upper Layer Protocol
- [ ] Identification
- [ ] Source Port
- [x] Destination IP address — Correct!

Question 8

2 / 2 pts

It is the responsibility of a routing algorithm to correlate MAC addresses with IP addresses.

- True
- False

Correct!

Question 9

2 / 2 pts

If an IP datagram is fragmented into 1000-byte fragments, and later encounters a link with an 800-byte MTU, a special procedure (other than standard IP fragmentation) must be used.

- True
- False

Correct!

Question 10

2 / 2 pts

The "traceroute" application (on Windows) sends UDP messages by default.

- True
- False

Correct!

Question 11

2 / 2 pts

The transport-layer header is encapsulated in the first fragmented IP datagram.

Correct!

- (•) True
- ( ) False

Question 12

2 / 2 pts

Given an internet represented as a weighted undirected graph, the shortest path between node *X* and node *Y* is the path that...

Correct!

- (•) has the smallest sum of edge weights.
- ( ) begins with the smallest weight on the first hop edge from node X
- ( ) connects node X to node Y directly
- ( ) has the smallest number of hops

Question 13

2 / 2 pts

The "Identification" header field is unchanged by IP datagram fragmentation.

Correct!

- (•) True
- ( ) False

Question 14

2 / 2 pts

It is the responsibility of a routing algorithm to determine a datagram's next hop information.

Correct!

- (•) True
- ( ) False

Question 15

2 / 2 pts

The "ping" application (on Windows) uses ICMP echo request/reply.

Correct!

- (•) True
- ( ) False

Question 16

2 / 2 pts

The path MTU is the smallest MTU on a path from sender to receiver.

Correct!

- (•) True
- ( ) False

Question 17

2 / 2 pts

In network graph terminology, [a] represent routers.

- ( ) Weights

Correct!

- (•) Nodes
- ( ) Shortest Path
- ( ) Edges

Question 18

2 / 2 pts

In network graph terminology, a [a] from A to B is the set of edges to traverse to reach B from A for the lowest total cost.

Correct!

- (•) Shortest Path
- ( ) Weight
- ( ) Node
- ( ) Edge

Question 19

2 / 2 pts

The transport-layer header is encapsulated in every IP datagram fragment.

- ( ) True

Correct!

- (•) False

Question 20

2 / 2 pts

The "time to live" field in a modern IPv4 datagram header specifies...

Correct!

- (•) the number of remaining hops before the datagram is dropped.
- ( ) the milliseconds remaining before the datagram is dropped.
- ( ) the seconds remaining before data in the datagram is considered obsolete.
- ( ) the seconds to wait for the remaining fragments of a datagram that has been fragmented.

Question 21

2 / 2 pts

If an IP datagram is fragmented into 1000-byte fragments, and later encounters a link with an 800-byte MTU, it is dropped.

- ( ) True

Correct!

- (•) False

Question 22

2 / 2 pts

ICMP can carry messages from... (Check all that apply)

Correct!

- [x] Router to Sender Host

Correct!

- [x] Destination Host to Source Host

Correct!

- [x] Router to Router

Correct!

- [x] Source Host to Destination Host

Question 23

2 / 2 pts

Network address translation alters IP to add new IP addresses.

- True
- False

Correct!

Question 24

2 / 2 pts

Network address translation is strictly a Layer-3 protocol.

- True
- False

Correct!

Question 25

2 / 2 pts

The IP header is encapsulated in IP datagram fragments.

- True
- False

Correct!

Question 26

2 / 2 pts

ICMP messages are carried within the payload of IP datagrams.

Correct!

- (•) True
- ( ) False

Question 27

1 / 1 pts

A private network uses a NAPT device at public IP address 128.100.116.1
The computers in the network use addresses of the form 10.0.0.x/22.
Suppose that computer inside the NATed network sends a request with

Source address: 10.0.0.4
Source port: 932

Destination address: 108.155.105.30
Destination port: 22

The next available port number on the NAPT device is 12000

PART 1:

What source and destination information do the request packet headers contain when the request is sent out by the sending host?

Source address: [Select]

Source port : [Select]

Destination address: [Select]

Destination port : [Select]

PART 2:

What source and destination information do the request packet headers contain when the request is sent out by the NAT box?

Source address: [Select]

Source port : [Select]

Destination address: [Select]

Destination port : [Select]

PART 3:

What source and destination information do the response packet headers contain when the response is received by the NAT box?

Source address: [Select]

Source port : [Select]

Destination address: [Select]

Destination port : [Select]

PART 4:

What source and destination information do the response packet headers contain when the response is received by the original sending host?

Source address: 108.155.105.30

Source port : [Select]

Destination address: [Select]

Destination port : [Select]

Answer 1:

Correct!

10.0.0.4

Answer 2:

Correct!

932

Answer 3:

Correct!

108.155.105.30

Answer 4:

Correct!

22

Answer 5:

Correct!

128.100.116.1

Answer 6:

Correct!

12000

Answer 7:

Correct!

108.155.105.30

Answer 8:

Correct!

22

Answer 9:

Correct!

108.155.105.30

Answer 10:

Correct!

22

Answer 11:

Correct!

128.100.116.1

Answer 12:

Correct!

12000

Answer 13:

Correct!

108.155.105.30

Answer 14:

Correct! 22

Answer 15:

Correct! 10.0.0.4

Answer 16:

Correct! 932

Question 28

6 / 6 pts

Suppose that a 1600-byte datagram (identification #20) must transit a network which has a 740-byte MTU. Assume the minimum IP and TCP header sizes, i.e., the IP header is 20 bytes and the TCP header is 20 bytes.

1. How many fragments are created? [Select] fragments
2. How many bytes of application data are carried in the first fragment? [Select] bytes
3. How many bytes of application data are carried in the second fragment? [Select] bytes
4. How many bytes of application data are carried in the last fragment? [Select] bytes
5. What is the identification number of the second fragment? # [Select]
6. What is the fragment offset in the last fragment? [Select]

Answer 1:

Correct! 3

Answer 2:

Correct! 700

Answer 3:

Correct! 720

Answer 4:

Correct! 140

Answer 5:

Correct! 20

Answer 6:

Correct! 180

Question 29

6 / 6 pts

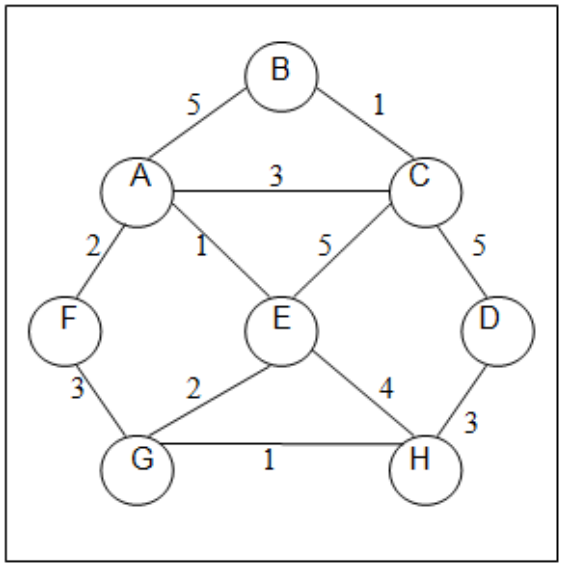
Using the version of *Dijkstra's Algorithm* discussed in the lectures (see below), and the network configuration in the graph (see below), to calculate the shortest path from node *H* to node *B.*

(NOTE#1: *H* is ***not*** in the original set S.)
(NOTE#2: A tie goes to the lower node (alphabetically).
(NOTE#3: If you use the textbook version of *Dijkstra's Algorithm*, ***find*** the 3rd node to be added to set S' , where S = {A,B,C,D,E,F,G} and S' starts as {H}.)

- What is the 3rd node to be eliminated from the set **S** = {A,B,C,D,E,F,G}?
  E
- What is the full shortest path from node H to node B? (e.g. for a path from H to D you would type "H-D" without the quotes) H-G-E-A-C-B
- What is the cost of the shortest path from node H to node B?
  8

- Fill in the complete routing table for node H, as it would be calculated by Dijkstra's algorithm and stored inside router H. (It's OK to do this by inspection; you don't have to crank through Dijkstra's algorithm for each destination.)

Destination	First Hop
A	G
B	G
C	G
D	D
E	G
F	G
G	G



Dijkstra's algorithm

```
S = {all nodes except source}
for u in S { /*initialization*/
    D[u] = edge weight (if edge (source, a)
           exists) or ∞ (otherwise)
    R[u] = u (if edge (source, u) exists) or
           * (otherwise)
    P[u] = source ((if edge (source, u) exists)
           or * (otherwise)
}
while (not empty(S)) {
    u = node with smallest value in D
        /* if tie, choose lower (alpha) node */
    if u in S {
        if(D[u] == ∞) {
            error: "no path"; exit;}
        S = S – {u};
        for (each v such that edge (u, v) exists) {
            if(v in S) {
                c = D[u] + weight (u, v);
                if(c < D[v]) {
                    D[v] = c;
                    R[v] = R[u];
                    P[v] = u
                }
            }
        }
    }
}
```

Answer 1:

Correct!

E

Answer 2:

Correct!

H-G-E-A-C-B

orrect Answer

H - G - E - A - C - B

orrect Answer

HGEACB

orrect Answer

H G E A C B

Answer 3:

Correct!

8

Answer 4:

Correct!

G

Answer 5:

Correct! G

Answer 6:

Correct! G

Answer 7:

Correct! D

Answer 8:

Correct! G

Answer 9:

Correct! G

Answer 10:

Correct! G

Quiz Score: **60** out of 60