Final Exam

Due Aug 14 at 11:59pm **Points** 100 **Questions** 26
Available Aug 8 at 12am - Aug 15 at 11:59pm 8 days **Time Limit** None

Instructions

This is an untimed, open book, open note, and open Canvas site exam.

You may start the exam and come back to it before the due date. DO NOT submit the exam until you have answered all the questions.

It is 26 questions in length. The questions are multiple choice and short answer.

Attempt History

	Attempt	Time	Score
LATEST	Attempt 1	1,076 minutes	81 out of 100

ⓘ Correct answers are hidden.

Score for this quiz: **81** out of 100
Submitted Aug 12 at 6:27pm
This attempt took 1,076 minutes.

Question 1 — 4 / 4 pts

Consider the unsigned decimal number 35. What is the value in hexadecimal?

35_{10} = _____ 16

23

Question 2

3 / 3 pts

Consider the eight bit signed binary number 1110 0101. Convert it to signed decimal from assuming the signed binary number is represented using signed magnitude.

1110 0101

-101

Question 3

3 / 3 pts

Consider the eight bit signed binary number 1110 0101. Convert it to signed decimal from assuming the signed binary number is represented using one's compliment.

1110 0101

-26

Question 4

3 / 3 pts

Consider the eight bit signed binary number 1110 0101. Convert it to signed decimal from assuming the signed binary number is represented using two's compliment.

1110 0101

-27

Question 5

5 / 5 pts

Consider the following 32 bit binary representation of the value using IEEE 754 single precision floating point representation. Show the corresponding signed number in decimal.

01000001001010100000000000000000

10.625

Question 6

4 / 4 pts

The truth table for a Boolean function F(a, b, c) is given below:

a	b	c	F
0	0	0	0
0	0	1	1
0	1	0	0
0	1	1	0
1	0	0	1
1	0	1	1
1	1	0	0
1	1	1	0

Which representation of F, using sum of products Boolean expression, is correct. They are not minimized.

- F(a,b,c) = a'b'c+a(bc)'+ab'c
- F(a,b,c) = a'b'c+ab'c'+ab'c
- F(a,b,c) = a'b'c+a(bc)'+ab'c
- F(a,b,c) = (ab)'c+a(bc)'+ab'c

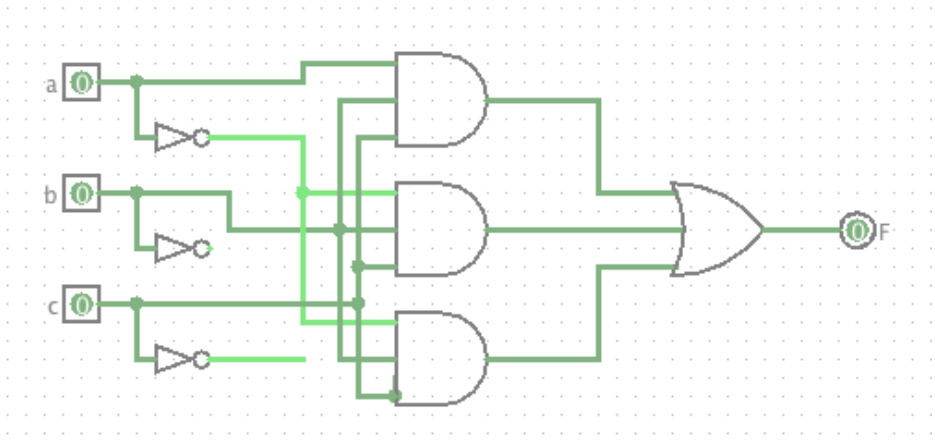
Question 7

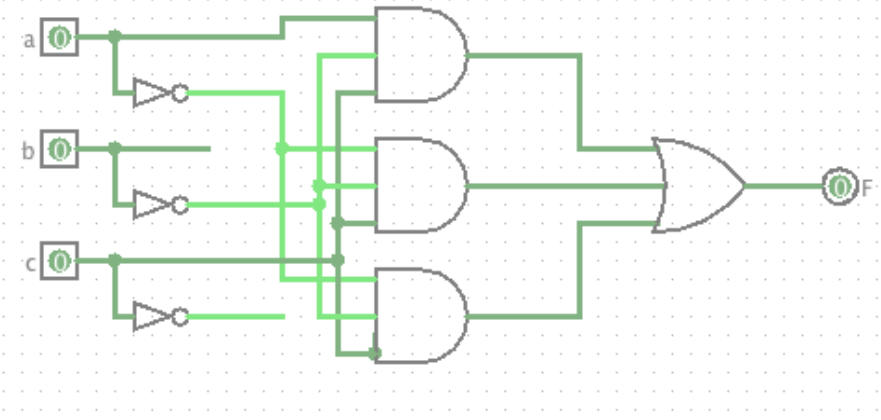
4 / 4 pts

The truth table for a Boolean function F(a, b, c) is given below:

a	b	c	F
0	0	0	0
0	0	1	1
0	1	0	0
0	1	1	0
1	0	0	1
1	0	1	1
1	1	0	0
1	1	1	0

Which diagram most closely matches the function F.


a
b
c
F


a
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c
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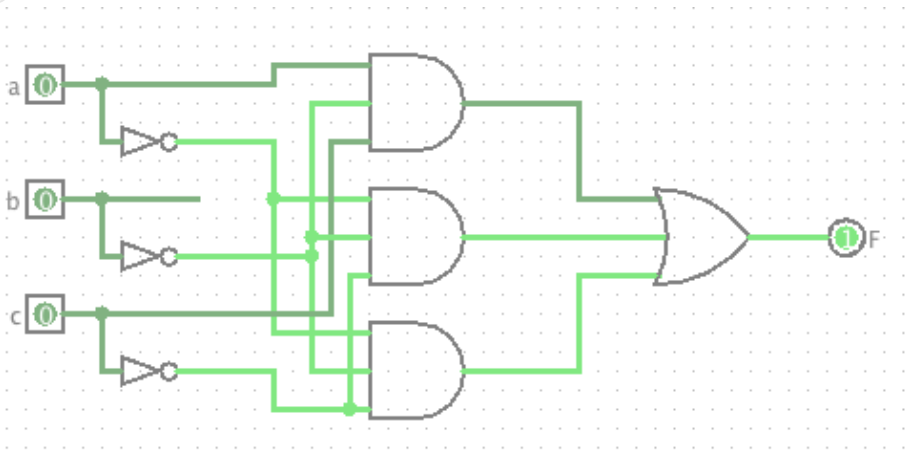
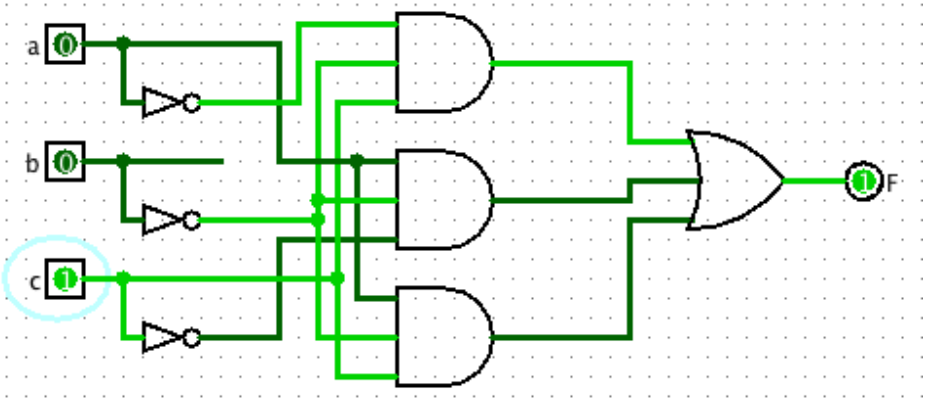

a
b
c
F



Question 8

5 / 5 pts

A cache-based system experiences a cache hit rate of 90%. A cache hit requires 1 clock cycle and a main memory access requires 10 clock cycles. Main memory is only accessed after a cache miss. On a cache miss, the cache is updated from main memory and the read is made from cache.

What is the Effective Access Time (EAT) for this system? Give you answer in terms of clock cycles.

- 1 clock cycle
- 3 clock cycles
- 4 clock cycles
- 2 clock cycles

Question 9

3 / 3 pts

Suppose that a computer using a set-associative cache has 2^{20} words of main memory and a cache of 64 blocks, where each cache block contains 16 words.

If this cache is 2 way set associative, what is the format of the memory address as seen by the cache? In particular, what are the sizes of the tag, set and word fields?

- word: 4 bits
  set: 11 bits
  tag: 5 bits
- word: 5 bits
  set: 11 bits
  tag: 4 bits
- word: 4 bits
  set: 5 bits
  tag: 11 bits
- word: 5 bits
  set: 4 bits
  tag: 11 bits

Question 10

3 / 3 pts

Suppose that a computer using a set-associative cache has 2^{20} words of main memory and a cache of 64 blocks, where each cache block contains 16 words.

If this cache is 8 way set associative, what is the format of the memory address as seen by the cache? In particular, what are the sizes of the tag, set and word fields?

- word: 4 bits
  set: 3 bits
  tag: 13 bits

word: 4 bits
set: 13 bits
tag: 3 bits

word: 13 bits
set: 3 bits
tag: 4 bits

word: 3 bits
set: 4 bits
tag: 13 bits

Incorrect

Question 11

0 / 4 pts

A person upgrades their computer's processor. The processor is responsible for 80% of the system's computing effort. What is the maximum possible system speedup (as a percentage) that can be achieved by upgrading the processor?

- 500%
- 300%
- 400%
- 200%

Question 12

3 / 3 pts

IP best matches which layer of the OSI reference model?

- Network

- Transport
- Data Link
- Physical

Question 13

4 / 4 pts

A TCP connection is made between Port 234 on Host A (with IPv4 address 192.168.2.101) and Port 80 on Host B (with IPv4 address of 192.168.1.2).

What is the minimum number of TCP segments that must be sent to establish a connection?

- 1 for the 3 way handshake
- 3 for the 2 way handshake
- (selected) 3 for the 3 way handshake
- 2 for the 3 way handshake

Question 14

5 / 5 pts

A TCP connection is made between Port 234 on Host A (with IPv4 address 192.168.2.101) and Port 80 on Host B (with IPv4 address of 192.168.1.2).

Which of the values of the following fields in the packets sent from Host A to Host B are correct.

IP Source Address: 192.168.1.2
IP Destination Address: 192.168.2.101
TCP Source Port: 234
TCP Destination Port: 80

IP Source Address: 192.168.2.101
IP Destination Address: 192.168.1.2
TCP Source Port: 80
TCP Destination Port: 234

IP Source Address: 192.168.2.101
IP Destination Address: 192.168.1.2
TCP Source Port: 234
TCP Destination Port: 80

IP Source Address: 192.168.1.2
IP Destination Address: 192.168.2.101
TCP Source Port: 80
TCP Destination Port: 234

Question 15

5 / 5 pts

A TCP connection is made between Port 234 on Host A (with IPv4 address 192.168.2.101) and Port 80 on Host B (with IPv4 address of 192.168.1.2).

At some point after the connection is established, Host A sends Host B a TCP segment with the TCP header values given below in decimal. The ACK and PSH flags are true (contains a 1 bit) and all other flags are false (contains a 0 bit).
* Sequence number = 1,240
* Acknowledgment (ACK) number = 9,080 - requested
* Window = 10
What range of bytes should be now be sent from Host B to host A without any additional acknowledgment being sent from Host A to host B?

9080 - 9091

9080 - 9089

- 9080 - 9090
- 9079 - 9089

Incorrect

Question 16

0 / 6 pts

Consider a subnet identified as follows: 192.168.31.0/26.

What is the range of IP version 4 addresses in the subnet? Use dot-decimal notation for the answer.

- 192.168.31.0 - 192.168.31.127
- 192.168.31.0 - 192.168.31.255
- 192.168.31.0 - 192.168.31.63
- 192.168.31.0 - 192.168.31.31

Question 17

3 / 3 pts

Consider a subnet identified as follows: 192.168.31.0/26.

Using the IP ranges from this subnet, what is the IP network mask used by hosts on the subnet?
Use dotted-decimal notation for the answer.

- 255.255.255.224
- 255.255.255.0

- 255.255.255.192
- 255.255.255.128

Question 18

8 / 8 pts

Consider the routing tables for Router 1 (R1) and Router 2 (R2) as given below.

Router R1

Destination	Next Hop	Hop Count
A	R4	2
B	--	0
C	R3	4
D	R8	3

Router R2

Destination	Next Hop	Hop Count
A	--	0
B	R1	1
C	R5	2
D	R10	3

Router 1 uses the routing table at Router 2 to update its routing table. Complete the new routing table for Router 1 below. Router 1 and Router 2 are adjacent, i.e. they are 1 hop apart.

Router R1

Destination	Next Hop	Hop Count
A	R4	2
B	--	0
C	R3	4
D	R8	3

Router R1

Destination	Next Hop	Hop Count
A	R2	1
B	--	0
C	R2	3
D	R8	3

Router R1

Destination	Next Hop	Hop Count
A	R4	2
B	R2	1
C	R2	3
D	R8	3

Router R1

Destination	Next Hop	Hop Count
A	R2	1
B	--	0
C	R2	3
D	R2	4

Question 19

4 / 4 pts

Processor X has a 75-nanosecond clock cycle. On average it takes Processor X 2 clock cycles to execute an instruction. Processor X requires 100 instructions to implement a benchmark program. What is the expected time in nanoseconds, to execute the benchmark program?

- (●) 15,000 nanoseconds
- ( ) 7,500 nanoseconds
- ( ) 5,000 nanoseconds
- ( ) 150,000 nanoseconds

Question 20

3 / 3 pts

Consider RAID Level 5 (RAID-5).

Select the advantages of RAID-5 relative to other RAID schemes.

- [x] Good reliability and cost
- [x] Parity on separate disk
- [x] Very good on reads
- [ ] Uses less disk space

Question 21

3 / 3 pts

Consider RAID Level 5 (RAID-5).

What are the disadvantages of RAID-5 relative to other RAID schemes.

- [ ] If one disk fails, all data in the RAID 5 array are lost.
- [ ] The main disadvantage is that the effective storage capacity is only half of the total disk capacity because all data get written twice.
- [x] On writes, not as good as single disk.
- [x] Like RAID 3, this is complex technology.

Incorrect

Question 22

0 / 3 pts

Consider the four types of input/output control discussed in this class.

Which of the four control methods is best suited for rapid response to an input or output event?

- (•) Programmed I/O
- ( ) Channel I/O
- ( ) Interrupt-driven I/O
- ( ) Direct Memory Access

Question 23

3 / 3 pts

Consider the four types of input/output control discussed in this class.

Which of the four control methods is best suited for transfer of large blocks of data?

- [ ] Programmed I/O
- [x] Direct Memory Access
- [x] Channel I/O
- [ ] Interrupt-driven I/O

Question 24

3 / 3 pts

Host X retrieves a single HTML file from the HTTP server on Host Y.

Host Y sends the first TCP SYN message for the transaction?

- ( ) True
- (•) False

Incorrect

Question 25

0 / 3 pts

Host X retrieves a single HTML file from the HTTP server on Host Y.

Host Y sends the first TCP ACK message for the transaction?

- ( ) True
- (•) False

Incorrect

Question 26

0 / 3 pts

TCP uses a form of stop-and-wait protocol for part of its operation. Which part?

- 3 way handshake
- Data transfer
- Connection termination

Quiz Score: **81** out of 100