



Spring 2021 - CS150-01: Comptr Organizatn-Architecture (Wilder)

Exams

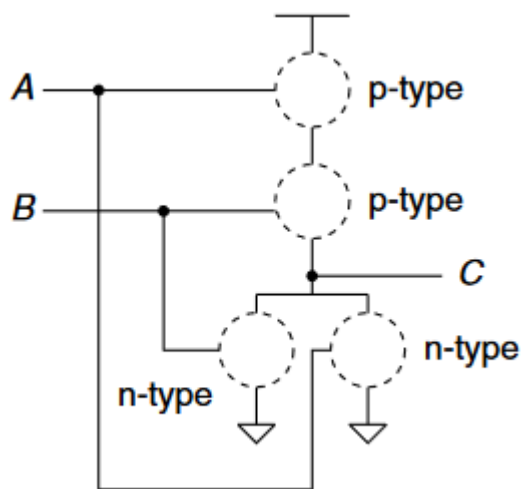
Review Test Submission: Final Exam

Review Test Submission: Final Exam

User	Kurian Georly Kunnathushery
Course	Spring 2021 - CS150-01: Comptr Organizatn-Architecture (Wilder)
Test	Final Exam
Started	5/11/21 12:45 PM
Submitted	5/11/21 2:05 PM
Due Date	5/11/21 2:45 PM
Status	Completed
Attempt Score	207 out of 252 points
Time Elapsed	1 hour, 20 minutes out of 2 hours
Results Displayed	All Answers, Correct Answers, Feedback, Incorrectly Answered Questions

Question 1

5 out of 5 points



The transistor-level circuit depicted above contains two inputs (A and B) and a single output named C. This circuit has four "holes" that are circled in dotted lines. Each of these holes is supposed to contain a transistor of the type specified by the name next to the hole (e.g., n-type or p-type). Each transistor in each hole can either be "closed" or "open". Recall that a "closed" transistor permits the flow of electrons, whereas an "open" transistor impedes the flow of electrons.

If we want the output C in the circuit to be a 0, the n-type transistor connected to input B must be "closed".

Answers: ☒ True
☐ False

Question 2

5 out of 5 points



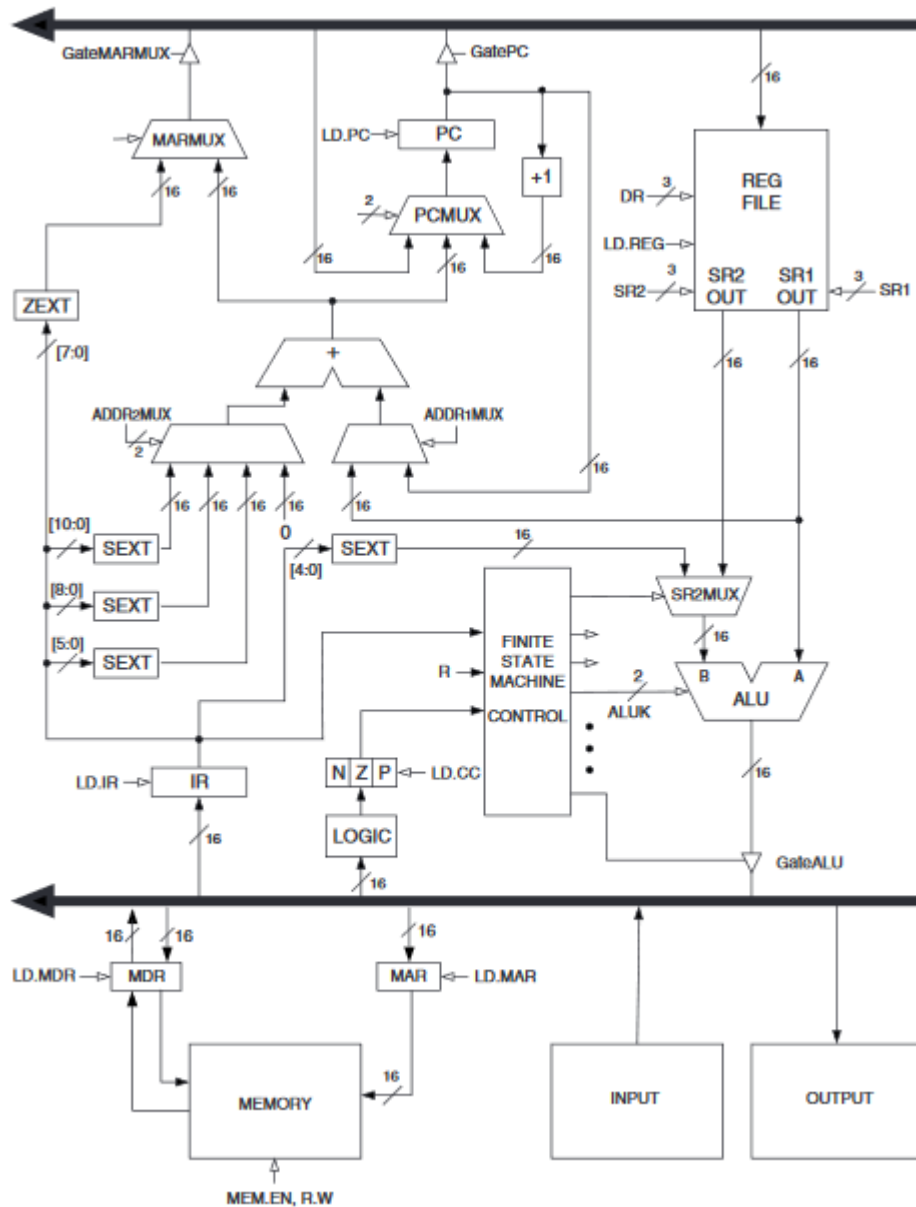
The Location Counter (LC) is a register inside the ATmega328.

Answers: ☐ True
☒ False

Question 3

5 out of 10 points





The diagram above shows the schematic for a stored program computer. What is the width of a data word in the computer that is shown above? Please justify your answer.

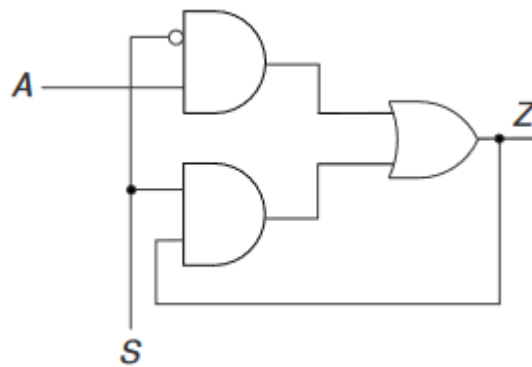
Correct Answer: [None]

Response Feedback: No justification provided.

Question 4

10 out of 10 points





In the circuit shown above, if S is switched from 0 to 1, how will the output Z be affected?

Correct Answer: [None]

Response Feedback: [None Given]

Question 5

10 out of 10 points



The diagram above shows the format of an instruction in a computer that has a 32-bit instruction word. In this format the OPCODE field holds the instruction opcode, the SRC and DST field hold register numbers, and the IMMED field holds an immediate value. If the computer has 60 opcodes and 32 registers, and we want all 32 registers to be used by both SRC and DST in a given instruction, what is the range of values that can be represented using the IMMED field? Assume that the IMMED field is interpreted as a two's complement number.

Answers: -16384..16383

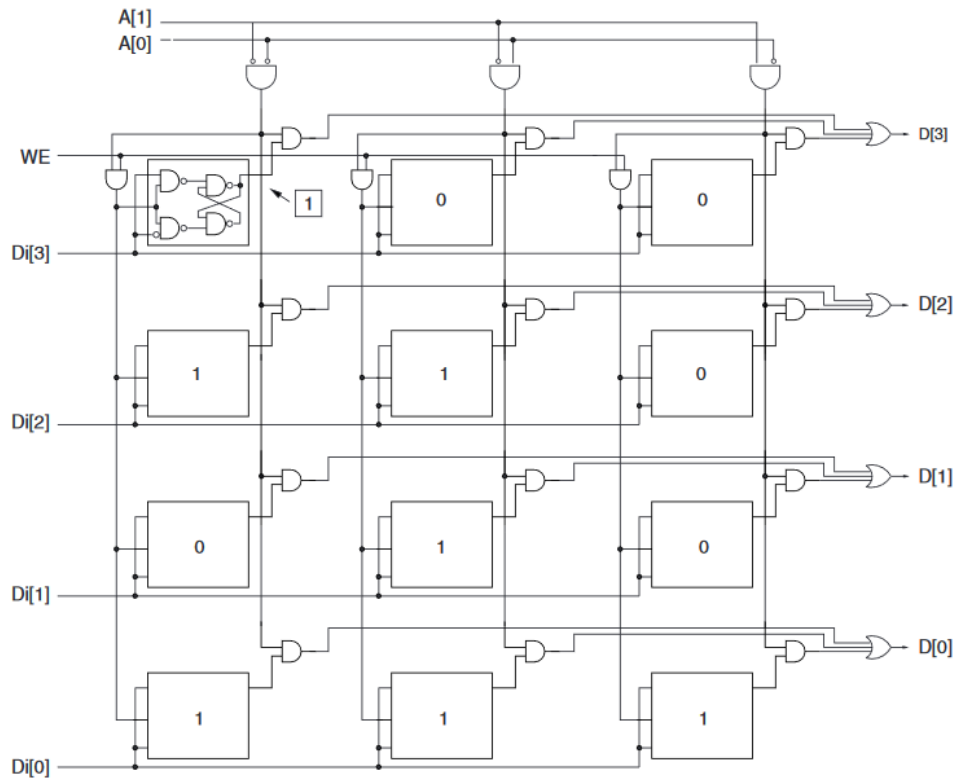
0..255

☒ -32768..32767

-128..127

Question 6

10 out of 10 points



The diagram above shows the schematic for a memory for a stored program computer. What is the address space of this memory?

Correct Answer: [None]

Response Feedback: [None Given]

Question 7

4 out of 5 points



Translate the following assembly language instruction into machine code:

ORI R29, 127

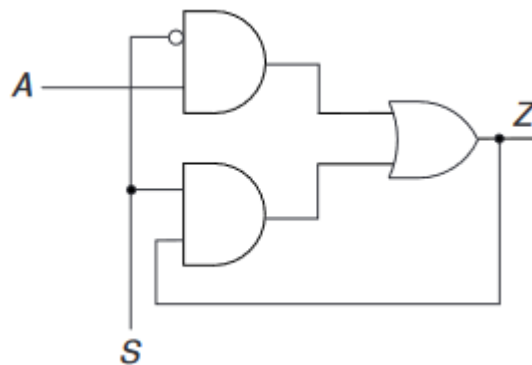
Correct Answer: [None]

Response Feedback: Answer is 0110 0111 1101 1111

Question 8

10 out of 10 points





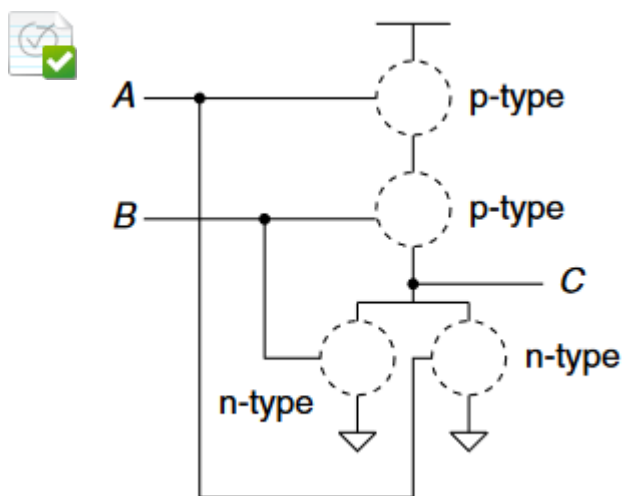
In the circuit shown above, what is the output Z for each value of A when S is 0?

Correct Answer: [None]

Response Feedback: [None Given]

Question 9

5 out of 5 points



The transistor-level circuit depicted above contains two inputs (A and B) and a single output named C. This circuit has four "holes" that are circled in dotted lines. Each of these holes is supposed to contain a transistor of the type specified by the name next to the hole (e.g., n-type or p-type). Each transistor in each hole can either be "closed" or "open". Recall that a "closed" transistor permits the flow of electrons, whereas an "open" transistor impedes the flow of electrons.

If we want the output C in the circuit to be a 1, the n-type transistor connected to input A must be "closed".

Answers: ☒ True
☐ False

Question 10

7 out of 25 points



Build an CS150 AVR assembly language subroutine called HerdR16 that will partition the bits in R16 such that all the 0 bits appear on the left and all the 1 bits appear on the right. For instance, if R16 contains the value 10101000 when your subroutine is called, R16 should contain the value 00000111 when your subroutine is finished. As another example, if R16 contains the value 10011010 when your subroutine is called, it should contain the value 00001111 when your subroutine is finished. You should direct the assembler to place your subroutine at address 0x20 in program memory. **Your subroutine must use only instructions that appear in the CS150 AVR instruction subset.**

Correct [None]

Answer:

Response Multiple syntax errors. Logic flaws guarantee that this subroutine

Feedback: won't visit more than one '1' bit in R16. No herding performed.
Incomplete.**Question 11**

5 out of 5 points



The 'C' in CMOS stands for "conventional".

Answers: True

☒ False**Question 12**

5 out of 5 points



You can change the location of the stack in an assembly language program for the ATmega328.

Answers: ☒ True

False

Question 13

5 out of 5 points



Convert the following machine code instruction into assembly language:

0010110001111111

Correct Answer: [None]

Response Feedback: [None Given]

Question 14

11 out of 12 points



	BEFORE		AFTER
R0	0x00	R0	0x11
R1	0x11	R1	0x11
R2	0x22	R2	0x33
R3	0x33	R3	0x33
R4	0x44	R4	0x44
R5	0x55	R5	0x55
R6	0x66	R6	0x66
R7	0x77	R7	0x44

1. PUSH R4
2. PUSH _____
3. POP _____
4. PUSH _____
5. POP R2
6. POP _____

The diagram above shows a snapshot of registers R0 through R7 before and after a certain sequence of six PUSH and POP instructions have been executed on an ATmega328.

What are the sequence of instructions that are executed on the BEFORE registers to produce the AFTER registers? Two of the instructions have been provided, and all opcodes for all instructions have been provided. In the space below, fill in the blanks for operations 2, 3, 4, and 6 to show what operation must be performed in those blanks to produce the specified result in the AFTER registers. Please number your answers corresponding to 2, 3, 4, and 6.

Correct Answer: [None]

Response Feedback: Ro is not a register name.

Question 15

4 out of 5 points



Convert the following machine code instruction into assembly language:

0001110000000000

Correct Answer: [None]

Response Feedback: The ADC instruction takes two operands. This is ADC R0,R0

Question 16

5 out of 5 points



Convert the following machine code instruction into assembly language:

1001010100000101

Correct Answer: [None]

Response Feedback: [None Given]

Question 17

5 out of 5 points



The JMP instruction requires more memory accesses than the CALL instruction.

Answers: True

☒ False**Question 18**

10 out of 10 points



The diagram above shows the format of an instruction in a computer that has a 32-bit instruction word. In this format the OPCODE field holds the instruction opcode, the DST, SRC1, and SRC2 fields hold register numbers, and the UNUSED field holds bits that aren't used by the given instruction. If the computer has 225 opcodes and 120 registers, and we want all of these registers to be used by the SRC1, SRC2, and DST fields in a given instruction, what is the minimum number of bits that are required to represent the DST (destination register) field?

Answers: 8 bits

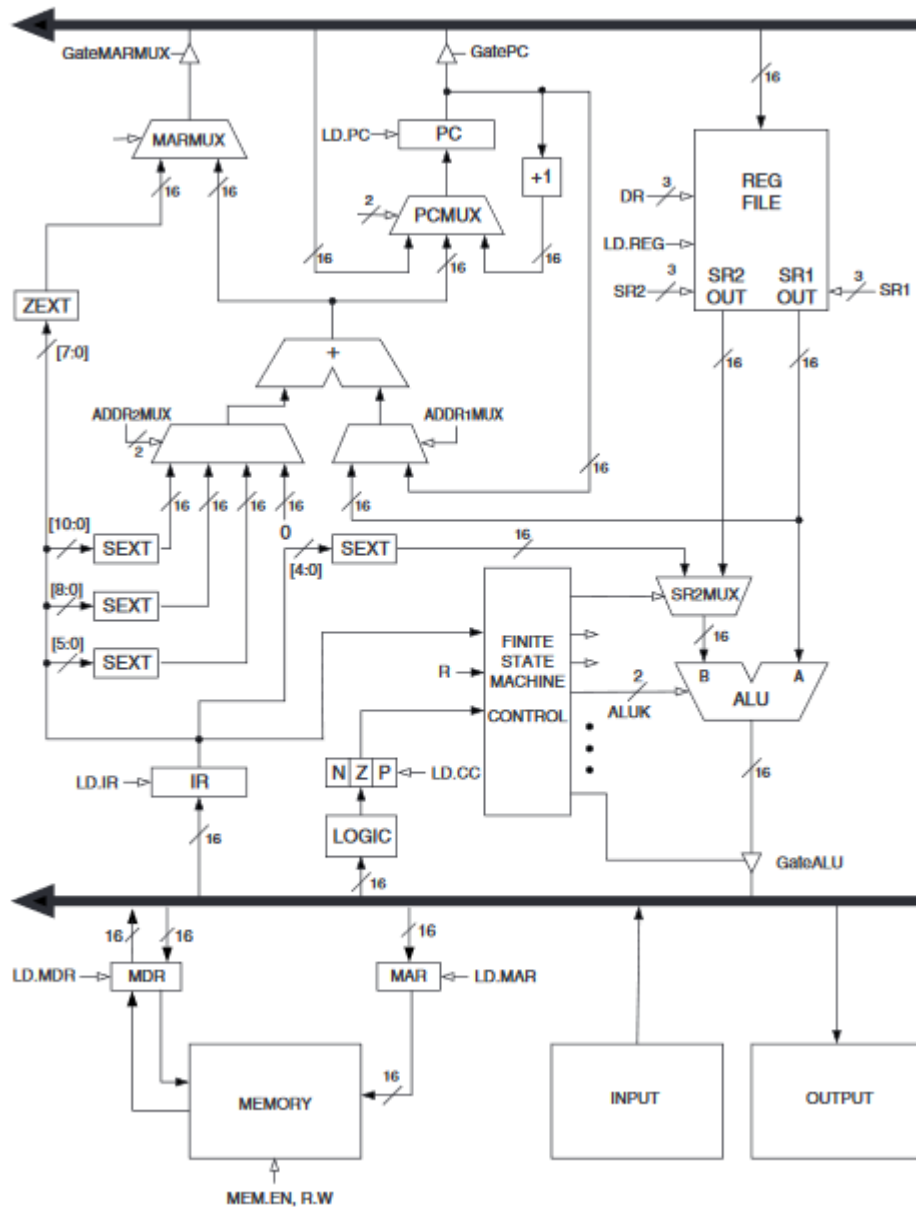
6 bits

9 bits

☒ 7 bits**Question 19**

5 out of 10 points





The diagram above shows the schematic for a stored program computer. What is the width of an instruction in the computer that is shown above? Please justify your answer.

Correct Answer: [None]

Response Feedback: No justification provided

Question 20

5 out of 5 points



Any Boolean function can be implemented using only OR and NOT gates.

Answers: ☒ True
☐ False

Question 21

10 out of 10 points

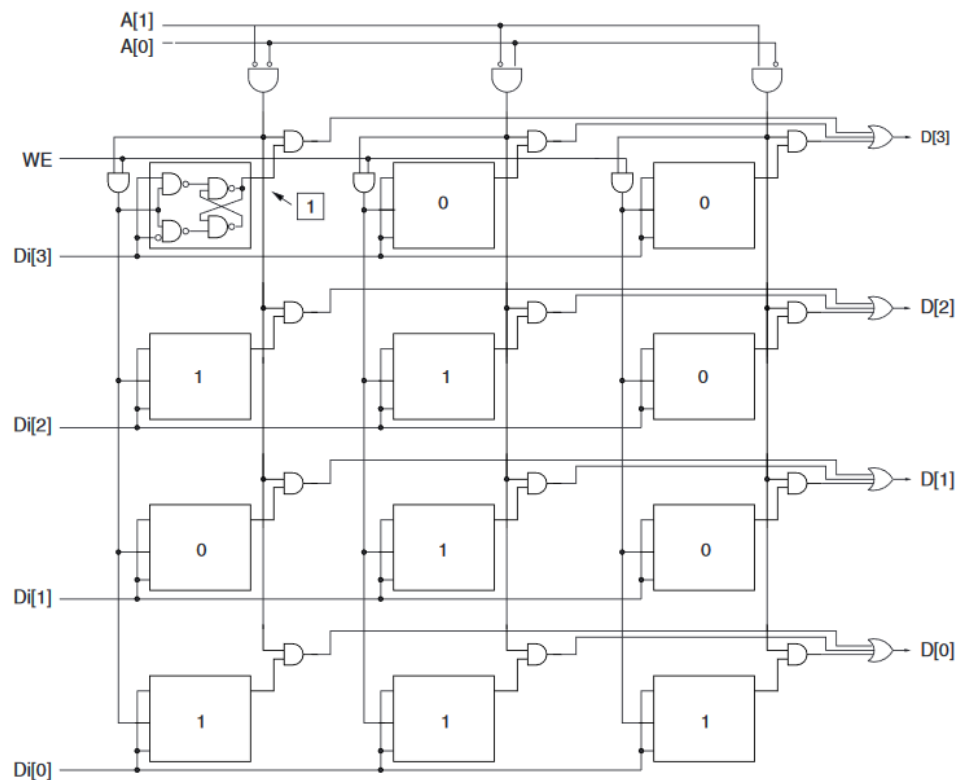


Given a memory that is addressed by 22 bits and is 3-bit addressable, how many bits can we store in this memory?

- Answers:
- 66
 - 176
 - 512
 - ☒ 12,582,912

Question 22

10 out of 10 points

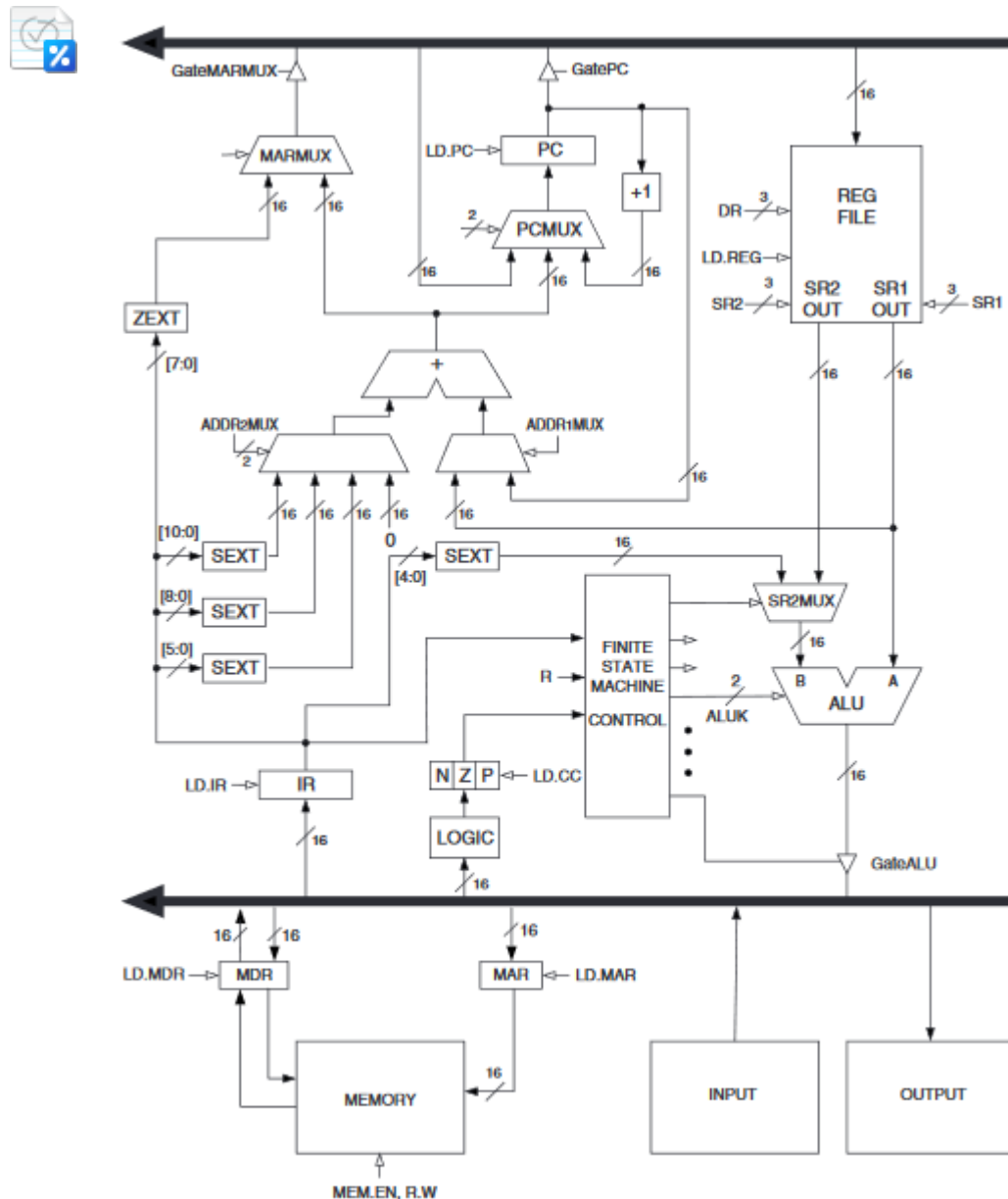


The diagram above shows the schematic for a memory for a stored program computer. What is the addressability of this memory?

Correct Answer: [None]
 Response Feedback: [None Given]

Question 23

5 out of 10 points



The diagram above shows the schematic for a stored program computer. Does the computer shown above implement the Harvard model or the Von Neumann model? Please justify your answer. A correct answer with no justification will receive at most half of the points possible for this question.

Correct Answer: [None]

Response Feedback: No justification provided.

Question 24

10 out of 10 points





The diagram above shows the format of an instruction in a computer that has a 32-bit instruction word. In this format the OPCODE field holds the instruction opcode, the DST, SRC1, and SRC2 fields hold register numbers, and the UNUSED field holds bits that aren't used by the given instruction. If the computer has 225 opcodes and 120 registers, and we want all of these registers to be used by the SRC1, SRC2, and DST fields in a given instruction, what is the minimum number of bits that are required to represent the OPCODE field?

- Answers:
- 7 bits
 - 10 bits
 - 9 bits
 - ☒ 8 bits

Question 25

10 out of 10 points



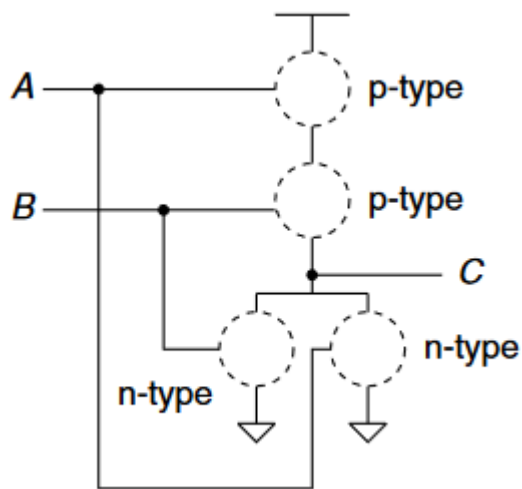
What ATmega328 register has logic tied to it that facilitates decoding?

- Answers:
- The DR
 - The LC
 - ☒ The IR
 - The PC

Question 26

5 out of 5 points





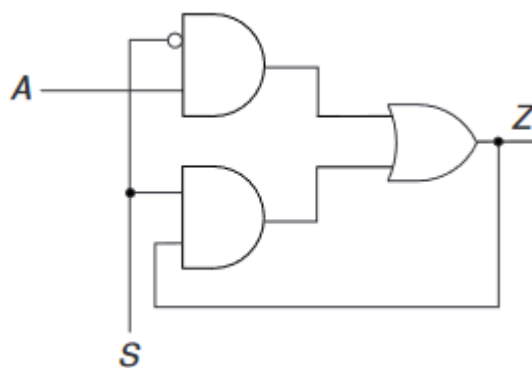
The transistor-level circuit depicted above contains two inputs (A and B) and a single output named C. This circuit has four "holes" that are circled in dotted lines. Each of these holes is supposed to contain a transistor of the type specified by the name next to the hole (e.g., n-type or p-type). Each transistor in each hole can either be "closed" or "open". Recall that a "closed" transistor permits the flow of electrons, whereas an "open" transistor impedes the flow of electrons.

If we want the output C in the circuit to be a 1, the p-type transistor connected to input A must be "open".

Answers: ☐ True
☒ False

Question 27

5 out of 5 points



Is the circuit shown above a sequential circuit?

Correct Answer: [None]
 Response Feedback: [None Given]

Question 28

5 out of 5 points



You can change the location that the ATmega328 fetches its first instruction from in an ATmega328 assembly language program.

Answers: True

☒ False

Question 29

10 out of 10 points



A certain combinational circuit has two 1-bit inputs and one 1-bit output. The value of the inputs over the past 6 cycles were 01, 10, 11, 01, 10, and 00. The value of the two inputs during the current cycle are 10. The value of the output during the current cycle is 1. Explain the effect on the current output of this circuit due to the values of the inputs during the previous 6 cycles.

Correct Answer: [None]

Response Feedback: [None Given]

Question 30

6 out of 15 points



Build a CS150 AVR assembly language subroutine called NumOnesInR0 that will count the number of 1 bits in R0 and place the result in R5. For example if R0 contains the value 01010110 when your subroutine is called, your subroutine will write the value 4 into R5. When your subroutine is finished, the value of R0 must be the same as it was before your subroutine was called. You should direct the assembler to place your subroutine at address 0x30 in program memory. **Your subroutine must use only instructions that appear in the CS150 AVR instruction subset.**

Correct Answer: [None]

Response:

Feedback: Same code as in Question 10 with some of the register names

changed. Same problems here. Will not perform specified operation.

Tuesday, December 14, 2021 6:22:25 PM PST

← OK