

EN.605.204.83.SP21 Computer Organization

Course Modules

Module 7: Midterm

Take Test: Midterm



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Test Information

Description You have the whole 7 days to complete this exam and may re-visit the exam as many times as you'd like. This midterm is "open book" so you can consult any materials you'd like including the open internet. I just ask that you perform all calculations, where required, by-hand and do not discuss the exam with other students. In order to receive full credit, please upload a document showing your work for questions 1, 2, 4, 5-9, 22, 23, and 29 for Question #33. The document can be typed or handwritten/scanned/cellphone-snapped. You can attach your work document by following the steps below:

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Click Save and Submit to save and submit. Click Save All Answers to save all answers.

Question Completion Status:**QUESTION 1****3 points****Save Answer**

Provide the 8-character hex representation for the following MIPS instruction (the label has already been resolved to a memory address for you): **bne \$t0, \$s0, 0x20**

QUESTION 2**3 points****Save Answer**

Provide the 8-character hex representation for the following MIPS instruction (no spaces): **addi \$a0, \$t4, 16**

QUESTION 3**3 points****Save Answer**

Given the hexadecimal bytes **0x70BB50CC**, copy the bytes to memory using big-endian order

Address	Content
---------	---------

0x00400003	<input type="text"/>
------------	----------------------

0x00400002	<input type="text"/>
------------	----------------------

0x00400001	<input type="text"/>
------------	----------------------

0x00400000	<input type="text"/>
------------	----------------------

QUESTION 4**3 points****Save Answer**

Provide the 8-character hex representation for the following MIPS instruction (no spaces): **jr \$ra**

Click Save and Submit to save and submit. Click Save All Answers to save all answers.

Question Completion Status:**QUESTION 6****3 points****Save Answer**

Convert the following 32-bit R-type instruction into one line of MIPS assembly code (format: op \$r1, \$r2, \$r3): **00000001010010110100100000100101**

QUESTION 7**3 points****Save Answer**

Convert the following 32-bit J-type instruction into one line of MIPS assembly code (format: op 0xNNNNNNNN): **00001000000100100001001000010010**

QUESTION 8**3 points****Save Answer**

Convert the following decimal number into the corresponding IEEE754 32-bit binary equivalent: **-40.5625**

11000010001000100100000000000000**QUESTION 9****3 points****Save Answer**

Convert the following 32-bit IEEE754 floating point number into it's decimal equivalent: **01000010100001110110000000000000**

67.6875**QUESTION 10****3 points****Save Answer**

The memory addresses of a MIPS stack grow from **top** to
bottom memory addresses.

Click Save and Submit to save and submit. Click Save All Answers to save all answers.

11. With little-endian byte order, the most significant byte of the data is placed at the byte with the lowest memory address

False

- False

QUESTION 12

3 points

Save Answer

The address of the top element of the MIPS stack is stored in the

stack pointer

QUESTION 13

3 points

Save Answer

A special instruction used in the MIPS instruction set to perform operating-system-like services

syscall

QUESTION 14

3 points

Save Answer

The primary purpose of pass one of a two-pass assembler is to build the symbol table

- True
 False

QUESTION 15

3 points

Save Answer

What is the primary reason a two-pass assembler is necessary rather than a one-pass assembler?

- A. Symbols may be used as operands before they are defined.
 B. Symbols need to be stored in the symbol table.
 C. Symbols may be defined before they are used as operands.
 D. Instructions may vary in length.

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Question Completion Status:

Relocation Information:

Symbol Table:

Discuss the purpose of the following segments located within an object file



Text Segment: It's the portion of an object file that contains executable instruction. The text segment will be loaded into a corresponding text segment in memory at run time.

Data Segment: It's the portion of an object file that contains initialized static variables. These initialized variables can be read and altered later at run time.

Relocation Information: Relocation is the processing of relocating code and data of a program from load addresses to assigned address. Assembler creates a list of pointers and put into a relocation table and store the form in the object file. When a program calls a function, the associated call instruction must transfer control to the proper destination address at execution.

Symbol Table:

QUESTION 17**3 points****Save Answer**

When making a call to a routine within MIPS, register contents may or may not be preserved across the call. For each register type, state whether its contents will be **PRESERVED** or **NOT PRESERVED**.

\$v0 **NOT PRESERVED**

\$sp **PRESERVED**

\$a1 **NOT PRESERVED**

\$ra **NOT PRESERVED**

\$t8 **NOT PRESERVED**

\$s2 **PRESERVED**

18. The process of disassembling code involves translating code from a high-level language into an intermediate representation and eventually into machine code. TRUE ????

QUESTION 18**3 points****Save Answer**

The process of disassembling code involves translating code from a high-level language into an intermediate representation and eventually into machine

Click Save and Submit to save and submit. Click Save All Answers to save all answers.

Question Completion Status:**QUESTION 19** ????**3 points****Save Answer**

Given a two pass assembler, identify which of one of these assembly processes would within the second pass

- A. Save addresses assigned to labels
- B. Scan for label definitions
- C. Create machine code
- D. Process pseudo-instructions

QUESTION 20 ????**3 points****Save Answer**

During Pass Two of a Two-pass Linker/Loader is to load and relocate the text content into memory

- True
- False

QUESTION 21**3 points****Save Answer**

The MIPS instructions below are demonstrating a basic example of the mod function (division with remainder) from a high level language. $(7 \text{ mod } 2) = 1$

```
addi $t0, $t5, 7  
addi $t1, $t6, 2  
div $t0, $t1
```

What single MIPS instruction will provide the remainder of 1 as calculated by this basic mod function

div \$t0, \$t1**QUESTION 22****3 points****Save Answer**

Please convert -119 into its 8-bit one's complement representation.

00001000

23. Convert -74 into its 8-bit two's complement representation.

0011 0110

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Question Completion Status:**QUESTION 24****3 points****Save Answer**

What is the smallest value that can be represented when using 16-bit unsigned numbers?

0**QUESTION 25****3 points****Save Answer**

Adding a positive and negative number together can never result in overflow.

- True**
- False

QUESTION 26**3 points****Save Answer**

What condition results when the sum of two integers is too large to be stored using the given number of bits?

overflow**QUESTION 27****3 points****Save Answer**

What data structure does an assembler use to store labels and their corresponding locations in memory?

symbol table**QUESTION 28****3 points****Save Answer**

Shifting a binary number to the left 6 times is the equivalent of multiplying by what number?

64**QUESTION 29****3 points****Save Answer**

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Question Completion Status:**X NAND Y =False****W=FALSE, X=TRUE, Y=TRUE, Z=FALSE**X XOR Z = **True**

NOT (X AND Y) NOR (W OR (X XOR Z)) =

(X NAND Z) OR Z =

NOT((W AND Y) NOR (W OR Y)) =

Z AND Y OR X NAND W =

QUESTION 30**3 points**

Save Answer

How many bits are required to represent a number with 14 hexadecimal digits?

56**QUESTION 31****3 points**

Save Answer

Match each expression with its respective law:

F ✓ $A * \sim A = 0$

A. Idempotent Law

B ✓ $\sim(A + B) = \sim A * \sim B$

B. DeMorgan's Law

E ✓ $(A * B) + (A * \sim B) = A$

C. Distributive Law

A ✓ $A * A = A$

D. Identity Law

D ✓ $A + 0 = A \quad A * 1 = A$

E. Absorption Law

C ✓ $A + BC = (A + B)(A + C)$

F. Complement Law

QUESTION 32**3 points**

Save Answer

A function (callee) must never use the 't' registers because their values must be preserved for the caller.

- True
 False

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