

Computer Organization and Operating System Design (CSE 500)

Quiz 1

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Name: _____

(10 pts)

Multiple Choice (20 pts)

1. Which "law" refers to the observation that the number of transistors per area of a microchip die doubles roughly every 18 months?
 - (a) Amdahl's Law
 - (b) Moore's Law
 - (c) Murphy's Law
 - (d) Faraday's Law
2. Which is the most common material used to construct modern semiconductors (microchips)?
 - (a) Gold
 - (b) Lead
 - (c) Silicon
 - (d) Latex
3. The piece of software that transforms code written in a high level language (like C) to a lower level language (like assembly) is called what?
 - (a) Word Processor
 - (b) Web Browser
 - (c) Operating System
 - (d) Compiler
4. Which of the following is NOT a processor Instruction Set Architecture (ISA)?
 - (a) Snapdragon
 - (b) ARM
 - (c) x86
 - (d) MIPS
5. Modern computer processor use which numbering system internally?
 - (a) Ternary (Base-3)
 - (b) Binary (Base-2)
 - (c) Hexadecimal (Base-16)
 - (d) Octal (Base-8)

Short Answer (20 pts)

For all of the following questions, assume MIPS architecture.

1. What are the **\$sX** registers used for?
2. What are the **\$aX** registers used for?
3. What are the **\$vX** registers used for?
4. Is a function caller or the function itself (callee) responsible for saving **\$sX** register values?

C to MIPS (25 pts)

1. Assume that there exists an array $A = [1, 2, 3, 4, 5]$ whose base pointer is stored in register $\$s0$.

Convert the following C snippet into MIPS assembly (assume that x is in $\$s1$ and y is in $\$s2$):

```
int x = 2;
int y;

y = A[x];
y = y * 8;
A[x+1] = y;
```

MIPS to C (25 pts)

1. Convert the following MIPS snippet into C.

Assume a variable `unsigned char x` is stored in register `$s0`.

```
sll $t0, $s0, 5  
srl $s0, $t0, 5
```

2. If `x = 255` at the beginning of the code in the previous question, what would `x` contain after the code executes. (*Extra Credit (10 pts)*)