

Name.....

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Midterm - CS U380 - Nov. 5, 2008

No calculators, PDAs, etc.

1 Representation of numbers

a. **Assuming an 8-bit word length**, What is the two's-complement representation of -97(base 10)? Show all your work.

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b. What is the 32 bit IEEE floating representation of $-6\frac{1}{6}$ (base10)?

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c. What is the ASCII representation for the digit '9', written out as 8 binary bits?

For the following questions, your MIPS code should follow the callee-save conventions for register usage that we have been using in this course.

2 Pointers

Translate into MIPS assembly language:

```
int bar(int *pi){
    int x, y;

    x = *pi;
    pi = pi + 1;
    y = *pi;
    return g(x + y);
}
```

3 Pointers and loops

Write a procedure in MIPS assembly language that implements exactly the following C code. It changes every upper case character in a string to a lower case character.

Note: `isupper(ch)` returns 1 if `ch` is upper case, and 0 otherwise. Your code should call this function; you do not have to write it.

```
void strtolower(char *str){

    int diff = 'a' - 'A';

    ch = *str;
    while(ch != '\0'){
        if(isupper(ch)){
            ch = ch + diff;
            *str = ch;
        }
        str = str + 1;
        ch = *str;
    }
    return;
}
```

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4 Functions

Translate into MIPS assembly language:

```
int foo(int x, int y, int z){  
    return(baz(x, y) + h(x + 1));  
}
```

5 Recursion

Translate the following function to MIPS assembly language. Your translation must make the recursive call.

```
int addup(int *pi){
    if(*pi == 0) {
        return 0;
    } else {
        return(*pi + addup(pi + 1));
    }
}
```

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