

CS31 Written Homework 6: IA32 if-else, functions, Name(s):

Due Wednesday, March 31 before noon

Question 1

Convert the following C code fragment to equivalent C goto.

```
// variable declarations                C goto version
int dog, cat, goat;                    -----

// ... assume some variable init
// code comes next ...

// convert this fragment:

if((dog > cat)) {
    dog = goat + cat;
    goat = cat*4;
} else if (dog > goat){
    goat = dog;
    dog = goat*2;
}
cat = goat + dog;
```

Question 2

Trace through the following IA32 code. Show the contents of the given memory and registers right before the instruction at point A is executed. Assume the `addl` instruction in `main` that is immediately after the `call` instruction is at memory address `0x1234`. Hints:

- remember to start execution in `main`.
- `%esp` points to the item on the top of the stack, so a `push` will grow the top of the stack and then move in the pushed value. A `pop` will move the value on top of the stack and then shrink the stack.
- The sequence of instructions `leave; ret` is equivalent to the sequence `movl %ebp, %esp; popl %ebp; popl %eip`.

<pre> foo: pushl %ebp movl %esp, %ebp subl \$16, %esp movl 8(%ebp), %eax addl %eax, %eax movl %eax, -4(%ebp) movl -4(%ebp), %eax leave # A ret main: pushl %ebp movl %esp, %ebp subl \$16, %esp movl \$6, -4(%ebp) pushl -4(%ebp) call foo addl \$4, %esp # at addr 0x1234 movl %eax, -4(%ebp) movl \$0, %eax leave ret </pre>	<table border="1" style="border-collapse: collapse; width: 100%;"> <thead> <tr> <th style="border: none;">Memory Address</th> <th style="border: none;">at A value</th> </tr> </thead> <tbody> <tr><td style="border: none;">0x8880</td><td style="border: none;"></td></tr> <tr><td style="border: none;">0x8884</td><td style="border: none;"></td></tr> <tr><td style="border: none;">0x8888</td><td style="border: none;"></td></tr> <tr><td style="border: none;">0x888c</td><td style="border: none;"></td></tr> <tr><td style="border: none;">0x8890</td><td style="border: none;"></td></tr> <tr><td style="border: none;">0x8894</td><td style="border: none;"></td></tr> <tr><td style="border: none;">0x8898</td><td style="border: none;"></td></tr> <tr><td style="border: none;">0x889c</td><td style="border: none;"></td></tr> <tr><td style="border: none;">0x88a0</td><td style="border: none;"></td></tr> <tr><td style="border: none;">0x88a4</td><td style="border: none;"></td></tr> <tr><td style="border: none;">0x88a8</td><td style="border: none;"></td></tr> <tr><td style="border: none;">0x88ac</td><td style="border: none;"></td></tr> <tr><td style="border: none;">0x88b0</td><td style="border: none;"></td></tr> <tr><td style="border: none;">0x88b4</td><td style="border: none;"></td></tr> <tr><td style="border: none;">0x88b8</td><td style="border: none;"></td></tr> <tr><td style="border: none;">0x88bc</td><td style="border: none;"></td></tr> <tr><td style="border: none;">0x88c0</td><td style="border: none;"></td></tr> </tbody> </table>	Memory Address	at A value	0x8880		0x8884		0x8888		0x888c		0x8890		0x8894		0x8898		0x889c		0x88a0		0x88a4		0x88a8		0x88ac		0x88b0		0x88b4		0x88b8		0x88bc		0x88c0	
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