CS4400 *Alex Clemmer, u0458675*

Lecture 5 Problem Set

Problem 1

Match each of the three IA32 assembly-code routines on the left with the equivalent C function on the right.

`bar1` matches to `foo6`. `bar2` matches to `foo1`. `bar3` matches to `foo5`.

Problem 3.55

```
int foo(int x, y, z)
{
    int ret;
    y = y - z;
    ret = y;
    ret = ret << 31;
    ret = ret >> 31;
    y = y * x;
    ret = ret ^ y;

    return ret;
}
```

Problem 3

```
int foo(int *ptr, int a, short b, char c)
{
    *ptr += a >> c;
    return -*ptr & b;
}
```

translates to:

```
 ptr at %ebp+8, a at %ebp+12, b at %ebp+16, c at %ebp+20
foo:
    pushl %ebp
    movl %esp, %ebp

    movl 12(%ebp), %eax   ; put a in register %eax
    sarl 20(%ebp), %eax   ; shift a arithmetic right by c
    movl 8(%ebp), %ecx    ; put address ptr in %ecx
    movl (%ecx), %edx     ; put value at ptr in %edx
    addl %eax, %edx       ; add ptr and the shifted amount
    movl %edx, (%ecx)     ; write value change to ptr
    negl %edx             ; negate ptr
    movswl 16(%ebp), %eax ; pull b out of memory
    andl %edx, %eax       ; and ptr and b; return

    leave
    ret
```