- CPSC 275: Introduction to Computer Systems

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Fall 2025

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Solution to Homework 15

1.

```
Instruction                 Result
leal 6(%eax), %edx          6 + x
leal (%eax,%ecx), %edx      x + y
leal (%eax,%ecx,4), %edx    x + 4y
leal 7(%eax,%eax,8), %edx   7 + 9x
leal 0xA(,%ecx,4), %edx     10 + 4y
leal 9(%eax,%ecx,2), %edx   9 + x + 2y
```

2.

```
Instruction             Destination  Value
addl  %ecx,(%eax)       0x100        0x100
subl  %edx,4(%eax)      0x104        0xA8
imull $16,(%eax,%edx,4) 0x10C        0x110
incl  8(%eax)           0x108        0x14
decl  %ecx              %ecx         0x0
subl  %edx,%eax         %eax         0xFD
```

3.

```
movl 8(%ebp), %eax    # Get x
sall $2, %eax         # x <<= 2
movl 12(%ebp), %ecx   # Get n
sarl %cl, %eax        # x >>= n
```

4.

```
int t1 = x^y;
int t2 = t1 >> 3;
int t3 = ~t2;
int t4 = t3-z;
```

5.
   A. This instruction is used to set register `%edx` to zero, exploiting the property that `x ^ x = 0` for any `x`. It corresponds to the C statement `x = 0`.
   B. A more direct way of setting register `%edx` to zero is with the instruction `movl $0,%edx`.
   C. Assembling and disassembling this code will show that the version with `xorl` requires only 2 bytes, while the version with `movl` requires 5.

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