

- [CPSC 275: Introduction to Computer Systems](#)

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Fall 2025

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# Homework 3

NOTE: You are not required to hand in the following exercises, but you are strongly encouraged to complete them to strengthen your understanding of the concepts covered in class.

1. Suppose  $x = 0xc3$ . What is the value of  $x$  after each of the following operations is applied to  $x$ ?
  - A.  $x \ll 3$
  - B.  $x \gg 2$  (logical)
  - C.  $x \gg 2$  (arithmetic)
2. Repeat Exercise 1 with  $x = 0x66$ .
3. Using the bitwise operators we covered in class ( $\&$ ,  $|$ ,  $\sim$ ,  $\ll$ ,  $\gg$ ), write a C program or expressions for each of the following:
  - A. Given an integer  $x$ , determine whether it is even or odd without using the modulo (%) operator.
  - B. Given an integer  $x$ , determine its most significant bit.
  - C. Given two integers,  $x$  and  $n$ , extract the  $n$ th bit from the right of  $x$ .
  - D. Given two integers,  $x$  and  $n$ , write expressions to set (1) the  $n$ th bit of  $x$ . Also, write expressions to clear (0) and toggle (1/0) the  $n$ th bit of  $x$ .
  - E. Given an integer  $x$ , determine its number of set bits.

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