

Chapter 13

Short-Answer Exercises

[Java AP](#)

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1. What is the 2's complement of the following binary numbers?

Binary Number	2's Complement
11010000	
00000001	
00000000	

2. What is the signed binary 8 bits representation of the following decimal values?
(Assume we are following the 2's complement representation).

Decimal Value	Signed Binary 8 bits Representation
21	
0	
-128	

3. Convert the following signed binary values (Base 2) to signed decimal (Base 10).

Signed Binary Value	Decimal Value
00001000	
11010110	
11111111	

4. What is the following operation's output?

Operation	Output
0 & 0	
0 & 1	
1 & 0	
1 & 1	

5. What is the following operation's output?

Operation	Output
0 0	
0 1	
1 0	
1 1	

6. What is the following operation's output?

Operation	Output
$0 \wedge 0$	
$0 \wedge 1$	
$1 \wedge 0$	
$1 \wedge 1$	

7. What is the following operation's output?

Operation	Output
~ 0	
~ 1	

8. Assuming that N is an 8-bit integer, what is the value of N after the following operations?

Operation	N's Value
$N = 10 \ll 1$	
$N = 1 \ll 3$	
$N = -80 \ll 1$	
$N = 10 \gg 1$	
$N = 1 \gg 3$	
$N = -128 \gg 10$	
$N = 10 \ggg 1$	
$N = -10 \ggg 1$	
$N = -128 \ggg 5$	
$N = -128 \ggg 5$	4

9. Assuming that N is an 8-bit integer, what is the value of N after the following operations?

Operation	N's Value
$N = 0b0011_1010 \ \& \ 0b1111_1111$	
$N = 0b0011_1010 \ \& \ 0b0000_0000$	
$N = 0b0011_1010 \ \& \ 0b0010_0010$	
$N = 0b0011_1010 \ \ 0b0010_0010$	
$N = 0b0011_1010 \ \ 0b1111_1111$	
$N = 0b0011_1010 \ \ 0b0000_0000$	
$N = 0b0011_1010 \ ^ \wedge \ 0b0010_0010$	
$N = 0b0011_1010 \ ^ \wedge \ 0b1111_1111$	
$N = 0b0011_1010 \ ^ \wedge \ 0b0000_0000$	
$N = \sim 0b0011_1010$	
$N = \sim 0b1111_1111$	
$N = \sim 0b0000_0000$	

10. Assuming that N is an 8-bit integer, what is the value of N after the following operations?

Operation	N's Value
$N = -56 \ \& \ 32$	
$N = -1 \ \& \ 17$	
$N = -56 \ \ 32$	
$N = -1 \ \ 17$	
$N = -56 \ ^ \wedge \ 32$	
$N = -1 \ ^ \wedge \ 17$	
$N = \sim(-56)$	
$N = \sim 17$	

11. Assuming that N is an 8-bit integer, what is the value of N after the following operations?

Operation	N's Value
$N = (5 \% 2) \ll 2$	
$N = (5 \% 3) \gg (10 \% 3)$	
$N = (3 \gg 3) \ll 3$	
$N = 7 \& \sim(1 \ll 2)$	
$N = (1 12) \& (7 12)$	

12. Write the following function:

Function	<code>boolean isOdd(int value)</code>
Description	Using bitwise operators , this function determines if an integer value is odd . The function returns true if the value is odd and false if the value is even .

13. Write the following function:

Function	<code>boolean haveOppositeSigns(int n1, int n2)</code>
Description	Using bitwise operators , this function determines if two given integers have opposite signs (in other words, one is positive and the other negative). The function returns true if the two integers have opposite signs otherwise false is returned. <i>Hint: integers have a sign bit.</i>

14. Write the following function:

Function	<code>boolean isBitSet(int number, int bitPosition)</code>
Description	<p>Using bitwise operators, this function determines if a number has a specific bit set to 1.</p> <p>The function returns true if the specific bit is set to 1 otherwise false is returned.</p> <p><i>Example:</i></p> <p><i>"isBitSet (3, 1);" returns true because 3 = 00000011 and of course its 1st bit is set to 1.</i></p> <p><i>"isBitSet (3, 5);" returns false because 3 = 00000011 and of course its 5th bit is not set to 1.</i></p>