

CSC 209 Review 9 Solution

September 13, 2020

1. a) 8

Correct Solution

0

b) 0

c) 1

d) 6

Correct Solution

15

Notes

- a) is 0 because

$i \gg 1 + j \gg 1$ is $8 \gg 10 \gg 1$

Which is $0 \gg 1$

Which is 0.

- d) is 15 because

$i \& k$ is $78 \& 9$

which is 78

which is 15

2. Use XOR on target bit using value 1.

This is because the operator of two like values equals to 0, and unequal values equal to 1.

a	b	$a \oplus b$
0	0	0
0	1	1
1	0	1
1	1	0

3. The macro switches the value of x and y .

Take for example $x = 100$ (8) and $y = 010$ (4)

For the first part of macro, we have $x = x \oplus y = 100 \oplus 010 = 110$.

Taking this to second part of macro, we have $y = y \oplus x = 010 \oplus 110 = 100$.

Lastly, we have $x = x \oplus y = 110 \oplus 100 = 010$.

Thus, we can see the value of x and y are switched.

```

41  #define MK_COLOR(red,green,blue) ((long)((blue << 16) | (blue | (
    green << 8)) | red)

51  #define GET_RED(color) ((int)(color & 255))
2
3  #define GET_GREEN(color) ((int)((color >> 8) & 255))
4
5  #define GET_BLUE(color) ((int)((color >> 16) & 255))

```

6. a) Please see file `question_6_a.c` for details.
 b) Please see file `question_6_b.c` for details.

Notes

- Unsigned short has at max 4 bits.
- Any out-of-bound bits are omitted

7. Please see file `question_7.c` for details.

8. a) Returns first n bits of 1
 b) Extracts n bits from $m-n+2$ th bit

9. a) Please see file `question_9_a.c` for details.
b) Please see file `question_9_b.c` for details.
10. Please see file `question_10.c` for details.
11. The precedence of `&`, `^`, and `|` is lower than the equality operators.

So, given `if (key_code & (SHIFT_BIT | CTRL_BIT | ALT_BIT) == 0), (SHIFT_BIT | CTRL_BIT | ALT_BIT) == 0` will be evaluated first, which is incorrect.

To fix this problem, add parenthesis to `key_code & (SHIFT_BIT | CTRL_BIT | ALT_BIT)`.

12. The precedence of `+` is higher than `<<`. So, `8 + low_byte` in `high_byte << 8 + low_byte` will be evaluated before `high_byte <<`.

To fix this problem, add parenthesis to `high_byte << 8`.

13. All bits in `n` are gradually reduced to 0, starting from the right-most bit.

```
14 1 union ieee_float {  
2     float value;  
3     struct {  
4         unsigned int fraction: 23;  
5         unsigned int exponent: 8;  
6         unsigned int sign: 1;  
7     } parts;  
8 };
```

Correct Solution

```
1 struct ieee_float {  
2     unsigned int fraction: 23;  
3     unsigned int exponent: 8;  
4     unsigned int sign: 1;  
5 };
```